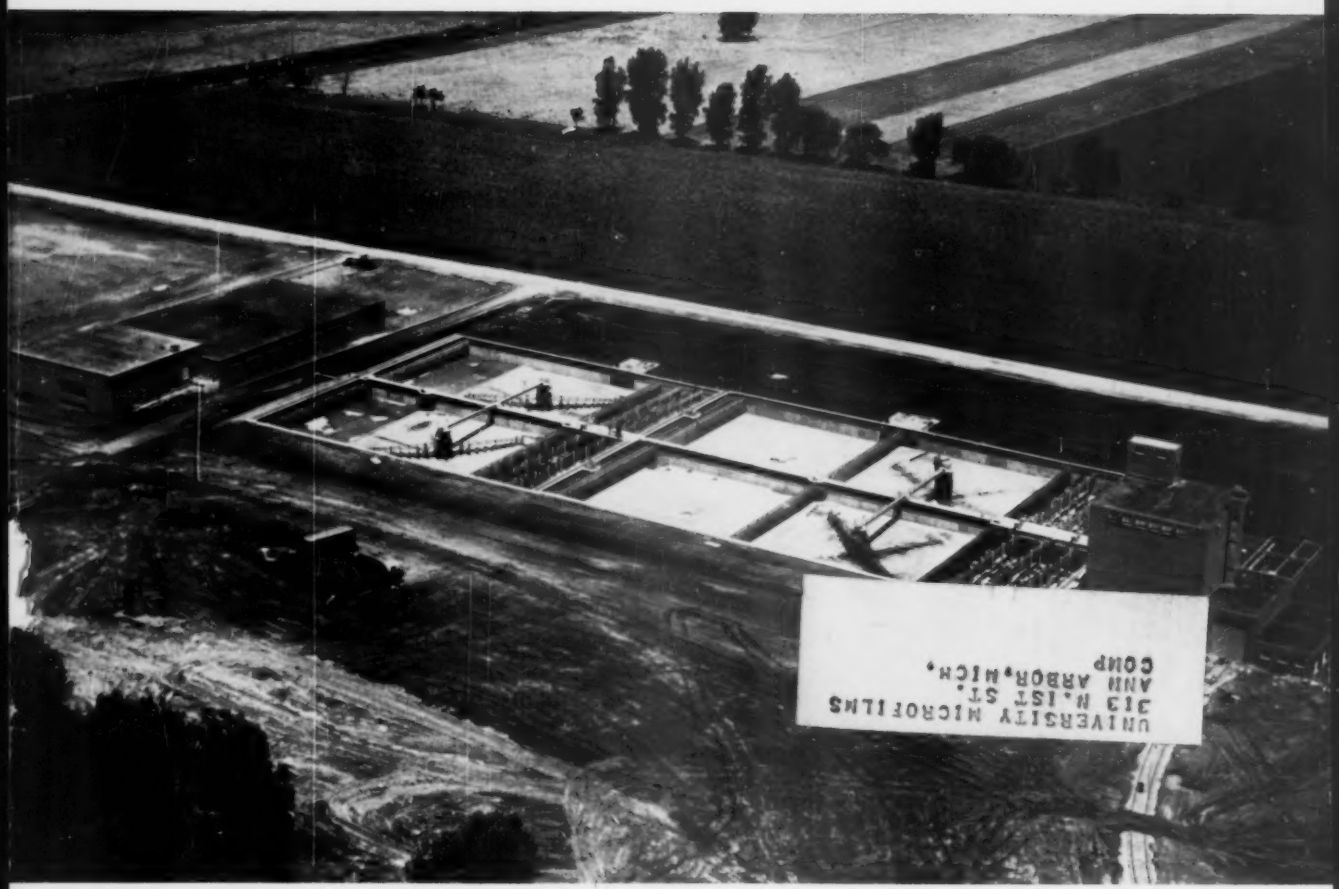
A Scranton Gillette Publication

JANUARY 1959

WATER & SEWAGE WORKS

WATER SUPPLY • SEWAGE DISPOSAL



UNIVERSITY MICROFILMS
313 N. 1ST ST.
ANN ARBOR, MICH.
COMP

▲ **AFTER 75 YEARS, Springfield, Ohio realized its dream of an adequate water supply. This new 36 mgd softening plant was typical of Water Supply Progress in 1958 (p. 1). Also in this issue are reviews of progress in Wastewater Disposal (p. 8), Research (p. 16), Construction (p. 23) and Equipment (p. 30).**

When the log jam breaks...

Thousands of tons of timber will be unleashed on the waters of the river. Similarly, our explosive surge of population is bearing down on already overburdened water works facilities in many communities.

New pipelines are essential; but only pipe of sustained high carrying capacity can meet greater demands with constant, predictable volume. That's why efficiency and economy dictate the use of LOCK JOINT CONCRETE PRESSURE PIPE for water supply and distribution lines. Its first low cost, ease of installation, long life, negligible maintenance and permanent high carrying capacity represent immediate and long term economies.

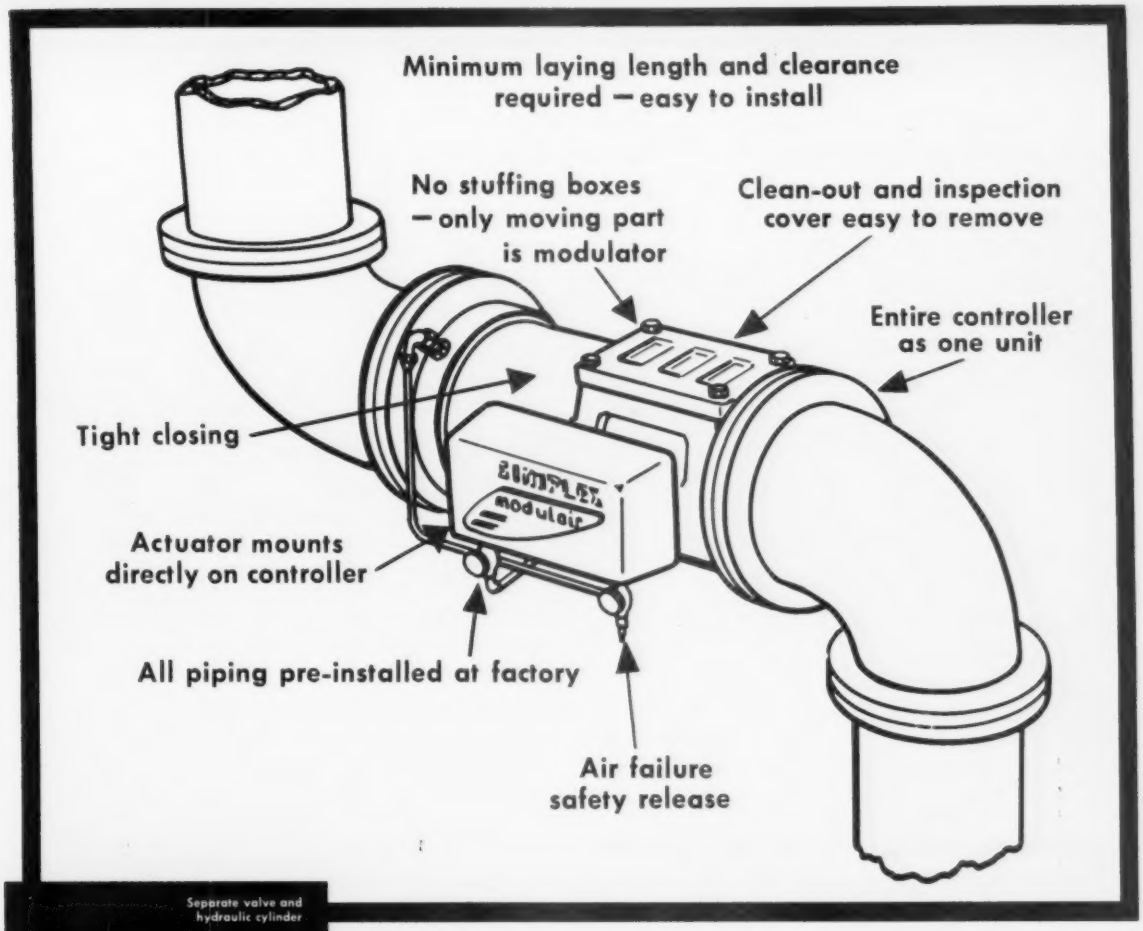
To bolster your water system against the shock of our yearly 3,000,000 increase in population, specify LOCK JOINT CONCRETE PRESSURE PIPE for complete dependability and over-all economy.

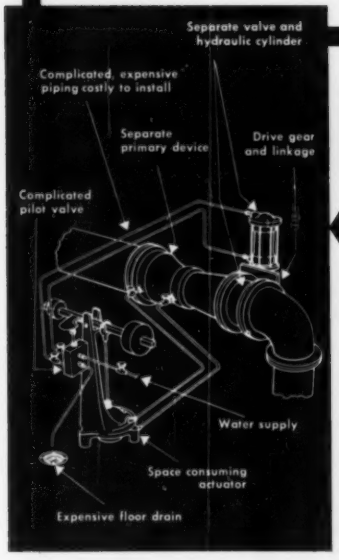
LOCK JOINT PIPE CO.

East Orange, New Jersey

Sales Offices: Chicago, Ill. • Columbia, S. C. • Denver, Col. • Detroit, Mich. • Hartford, Conn. • Kansas City, Mo. • Perryman, Md.

Pressure • Water • Sewer • REINFORCED CONCRETE PIPE • Culvert • Subaqueous


Minimum laying length and clearance required — easy to install
No stuffing boxes — only moving part is modulator
Clean-out and inspection cover easy to remove
Entire controller as one unit
Tight closing
Actuator mounts directly on controller
All piping pre-installed at factory
Air failure safety release
SIMPLEX
modulair



COMPARE and see how new Modulair® Flow Controller makes this design obsolete

best of all . . .

Simplex Modulair saves you money three ways

During 6 years of extensive use, the Modulair Rate of Flow Controller has proved time and time again that it can save money three ways:

1. Its unit construction makes it your best buy on a first cost basis.
2. You save installation time and money. Modulair is as easy to install as a piece of pipe.
3. Maintenance is practically nil, because of Modulair's exceptionally simple design.

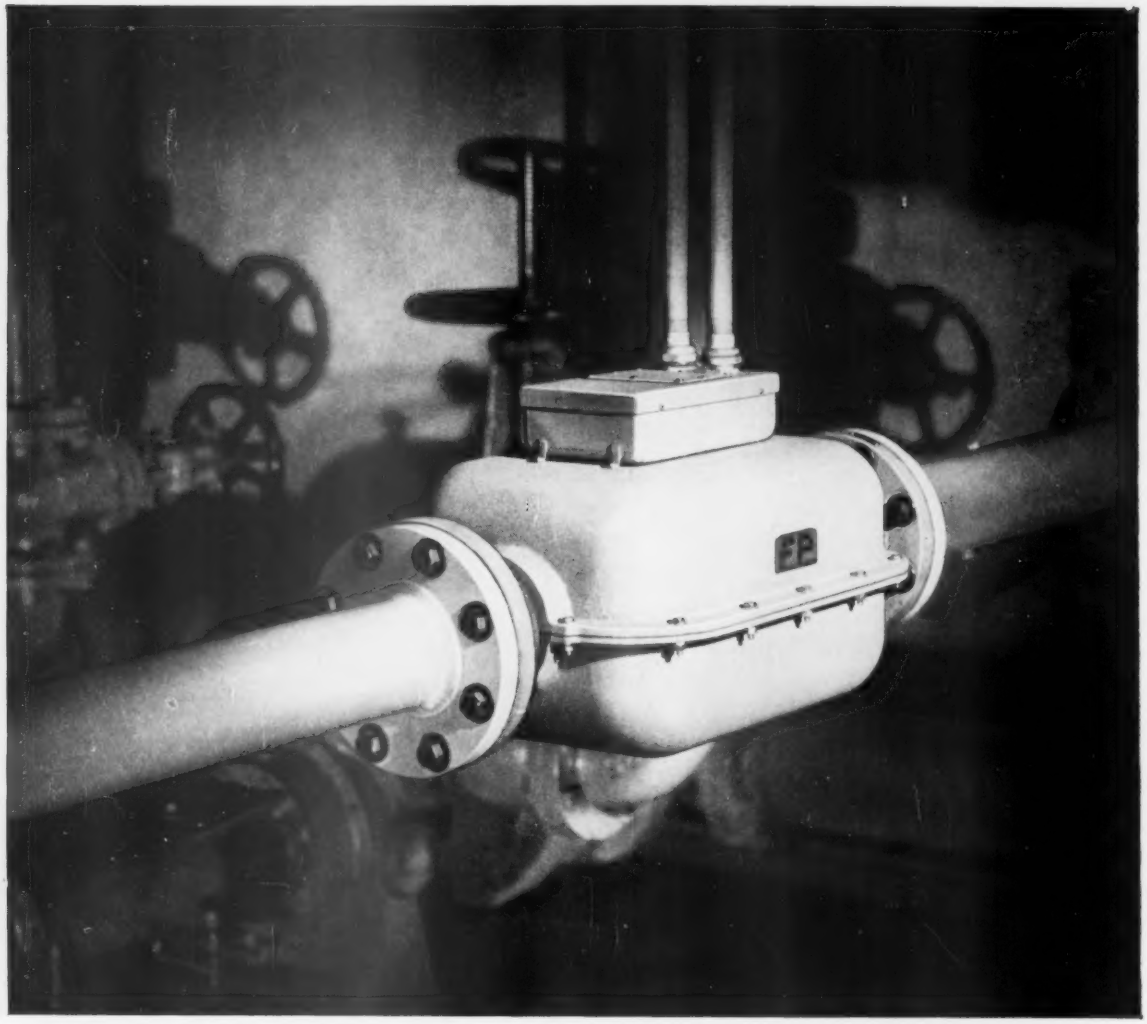
If all this interests you, write for our Bulletin 951.

SIMPLEX®

VALVE AND METER COMPANY

LANCASTER, PENNSYLVANIA

a subsidiary of PFAUDLER PERMUTIT INC.



NEW FLEXIBILITY IN OBSTRUCTIONLESS FLOWMETERING

Here's the world's *easiest-to-operate, easiest-to-read* magnetic flowmeter for water and sewage service. You can set any flow value at *full scale* . . . from 1 foot per second to 30 feet per second . . . at the turn of a direct-reading dial! Accuracy is ±1%, regardless of piping configurations. You get all the advantages of obstructionless flowmetering . . . plus these EXCLUSIVE F&P features . . . at no extra cost:

- *Any* primary is interchangeable with *any* secondary . . . no custom matching of meter to recorder.
- Range from 0.1 to 30 feet per second.
- Remote recording *up to 2000 feet* from the meter.
- Power requirements substantially reduced . . . 115 v, 60 cycle a-c useable in *all* sizes.
- Can measure reverse flows *without auxiliary equipment.*
- Fast response time . . . 2-3 seconds for a 100% flow change.
- Adjustable damping of flow signal.

For complete details get in touch with the F&P field engineer nearest you and write for Catalog 10D1416. Fischer & Porter Company, 119 Fischer Road, Hatboro, Pa. In Canada write Fischer & Porter (Canada) Ltd., 2700 Jane St., Toronto, Ont.

FP

FISCHER & PORTER CO.

Instrumentation and Chlorination

Vol. 106 No. 1

JANUARY • 1959

A Scranton Gillette Publication

E. SCRANTON GILLETTE
Publisher

GEORGE E. SYMONS, *Ph.D.*
Editor

•

Contributing Editors

D. P. Backmeyer — R. E. McKinney
J. R. Baylis — R. C. Merz
P. D. Haney — A M Rawn
C. E. Keefer — R. W. Simpson

•

CHICAGO OFFICE: 185 N. Wabash Av.
E. S. Gillette, Publisher
H. J. Conway, Adv. Ed.
W. A. Cawley, Associate Editor
M. B. Nylund, Sales Rep.
W. W. Hamilton, Western Sales Mgr.
M. C. Barr, Circulation Mgr.
R. J. Rooney, Makeup Editor

•

NEW YORK OFFICE: 155 East 44th St.
George E. Symons, Editor
F. C. Maurer, Associate Editor
J. S. Grumbling, Associate Editor
T. M. Todres, Administrative Assistant
Wm. R. Joyce, Midwestern Sales Mgr.
Terence McCoy, Eastern Sales Mgr.

•

85 Post Ave., San Francisco 4, Calif.
Duncan A. Scott & Co.

1901 West 8th St., Los Angeles 5, California
Duncan A. Scott & Co.

•

1201 Forest Lane, Birmingham 9, Ala.
Fred W. Smith, Sales Rep.

•

Published and Copyrighted 1959 by Scranton Publishing Co., Inc.

•

WATER & SEWAGE WORKS is published monthly with an extra issue in August. Subscriptions including the Reference Number issue in the U.S. and Canada, 1 year $5.00; 2 years $7.50; 3 years $10.00. Other countries $1.50 per year additional. Single copies 50c except Reference Number $1.00.

E. Scranton Gillette, President; George E. Symons, Executive Vice President; C. T. Gillette, Secretary; and H. J. Conway, Treasurer; M. B. Nylund, Vice Pres.

•

WATER & SEWAGE WORKS, Reg. U.S. Patent Off. Published monthly by Scranton Publishing Co., Inc., at 1600 N. Main St., Pontiac, Ill. Entered as second class matter at the post office at Pontiac, Ill., under Act of March 3, 1879.

WATER & SEWAGE WORKS

WATER SUPPLY PROGRESS *in 1958*
by **Lauren W. Grayson** — 1

WASTEWATER TECHNOLOGY PROGRESS *in 1958*
by **William D. Hatfield** — 8

RESEARCH PROGRESS *in 1958*
by **Harry A. Faber** — 16

CONSTRUCTION *during 1958*
by **R. W. Simpson and R. C. Merz** — 23

TIME RECORDER-TOTALIZERS *at sewage lift stations*
by **George W. Welsh, Jr.** — 30

EQUIPMENT REVIEW *for 1958*
by **F. C. Maurer** — 31

ROTARY SLUDGE DRYING SYSTEM *at Corpus Christi, Tex.*
a **staff report** — 36

FORK ATTACHMENT *for Tractors*
a **staff report** — 37

FUTURE DEVELOPMENTS *in water and waste water*
by **George E. Symons** — 38

TOXICITY, *Maintenance, Reclamation of Sewage*
a **report on FSIWA Meeting in Detroit** — 43

MEETING WATER NEEDS
by **J. B. Thompson** — 47

PUBLIC RELATIONS *in water works operations*
by **D. J. Suarez** — 50

THE EDITOR'S COMMENTS — 52

News—Here & There 7A
Equipment News 13A
New Bulletins 108A
Meeting Calendar 102A
News of Suppliers 32A

Frank J. Schwemler, Commissioner of Water
Consulting Engineers—Havens and Emerson
Prestressed Concrete pipe by Price Brothers

Cleveland...

...uses Pratt Valves in a tight spot

City installations, with limited clearances and traffic problems, are never easy. This Cleveland project, tying a new booster station into two distribution lines, is about as tough as they come.

Here the specifications could not call only for "dependable valves" . . . it had to be "*dependable valves that are easy to install.*" This is where the engineer and contractor can tap the benefits of Pratt's long experience . . . major features of Pratt Butterfly Valves include exactly those things that simplify difficult jobs: minimum head room, versatile operators that can be buried without vaults . . . and design and construction such that the valve will always be easy to open or close.

If you would like to know more about Pratt Butterfly Valves, 40 page manual B2B is yours for the asking. *Henry Pratt Co., 2222 S. Halsted St., Chicago 8, Ill.* Representatives in principal cities.

HENRY PRATT

RUBBER SEAT Butterfly Valves

Briefs

Water Supply Progress in 1958 was made in every community in the country, but in some cities the progress was more noticeable than in others. The installation of a desalting system for a municipal supply for 6300 persons was an outstanding example. A generally favorable business period and the rapid increase in water demands continued the trend since 1950. The backlog of needs increased to $2.65 billion, while expenditures for construction were just under last year. Interest rates dropped. The AWWA Do-It-Now Program and the AWWA "Operation Water Works Management" contributed to progress in 1958—page 1.

Wastewater Technology Progress in 1958 was evidenced in the gain in construction expenditures over 1957, in pollution abatement records under interstate compact operations, in new ideas for disposing of sludge solids and in growing industry-municipality cooperation in the disposal of wastewater. The Federation took some forward strides in programing additional service to members in the areas of professional advancement and improving public relations—page 8.

Research Progress in 1958 continued strong principally due to the effect of the research grants support under the U.S. Public Health Service Program. A summary of the principal activities in research during the past year is presented in a concise and readable manner—page 16.

Construction during 1958 showed a slow start but gained rapidly throughout the year to top the previous year. By year's end the expenditures for water and sewage works construction had reached $1.39 billion. In the eastern part of the country, water works projects for nearly 3 million persons averaged $23.00 per capita, while sewage works projects for nearly 4 million persons averaged $29.60 per capita—page 23.

New Equipment introduced in 1958 showed the effects of streamline designing to match the artistic architecture of new plants; electronic brains and graphic panels are forerunners of more automation. Illustrations of most of the new equipment ideas are shown—page 31.

Rotary Sludge Drying System at Corpus Christi, Tex., eliminated drying beds and miles of outfall sewers. A brief description of the installation is given—page 36.

Special Tractor Fork, designed to be attached to the arms of a tractor shovel, has been developed to increase the carrying capacity for concrete pipe by the tractor shovel—page 37.

Future Developments in water and sewage looks at the immediate past and at the influence this past will have on the future of water supply and wastewater technology—page 38.

Toxicity, Maintenance, Reclamation and Industry-Municipality Cooperation are among the topics covered in the final installment of the report on the meeting of the Federation in Detroit—page 43.

Radiation Detection in water supplies was one of the principal papers presented at the meeting of the N. J. Section of AWWA and reported here—page 46.

Meeting Water Needs in Oak Park, Mich., involved adequate planning for future expansion, detailed record keeping, initiation of a meter maintenance program and coordinated public relations efforts—page 47.

Public Relations are of particular importance in everyday water works operations. In this article the subject of utility responsibility, direct contact, indirect contact are discussed and five good will rules are presented —page 50.

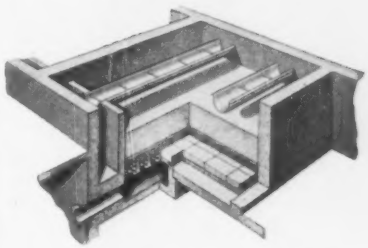
Only

Leopold

GLAZED TILE

FILTER BOTTOMS

Successfully meet all underdrain requirements



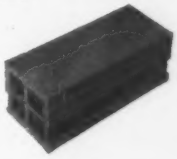
Filter unit showing Leopold Filter Bottom and Leopold Fiberglass-Reinforced Plastic Wash Troughs

Performance Proved in over 375 plants with a daily capacity of more than 2¾ billion gallons!

In this design, laterals and distributing blocks form a permanent unit that assures equal filtration and uniform wash distribution with low loss of head. Made of de-aired fire clay—vitrified and salt glazed—the blocks can't corrode, won't absorb water, are acid and alkali resistant, and are not subject to tuberculation.

In addition, the Leopold Filter Bottom needs only a shallow depth of small-sized filter gravel, does not require supporting concrete structures, and is the only design providing a fixed and controlled secondary backwash.

Literature and Complete Details Furnished on Request!



Leopold

F. B. LEOPOLD CO., INC.

Zelienople, Pa.

COMPLETE WATER PURIFICATION AND FILTER PLANT EQUIPMENT

NOW!

improved... streamlined... modernized...the

EDDY Hydrant

has ALL these features...

★ *Optional ground line break flange*
★ *Large diameter barrel for increased flow*
★ *O-ring or standard packing*
★ *New self-sealing rubber ring main valve packing*
★ *No lubrication required for fast, easy opening*
★ *Opens with the pressure—for instantaneous flow*
★ *Closes against the pressure—eliminates water hammer*

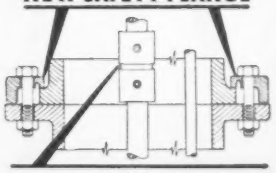
The EDDY Hydrant...improved... streamlined...modernized...retains all the basic advantages that have made these hydrants outstanding for four generations. Yet, it has important new advanced design features which provide the utmost in efficient, dependable, longlife fire protection service.

These new important advantages are provided without sacrificing interchangeability of working parts with EDDY hydrants now in service. Now, more than ever, EDDY offers maximum fire protection, economical maintenance and assurance against future obsolescence in your fire-fighting system.

Before buying or specifying hydrants, be sure you know how these advantages may benefit your community.

Optional break flange gives double protection against impact damage

NEW SAFETY FLANGE



NEW SAFETY COUPLING

EDDY VALVE COMPANY
A Subsidiary of James B. Clow & Sons, Inc.

WATERFORD NEW YORK

News----Here & There

William A. Cawley

became an Associate Editor on the staff of the Scranton Publishing Co. Inc. on January 1. He will serve in that capacity on *Water & Sewage Works, Industrial Wastes* and *Modern Highways* magazines, and will be located in the Chicago office of the company.

Mr. Cawley is a native of New York City, but spent most of his life in Boston, Mass. He holds an A.B. degree in Natural Sciences from Harvard, a Bachelor of Science in Civil Engineering from Tufts and an S.M. in Sanitary Engineering from the Massachusetts Institute of Technology.

For the past three and a half years Mr. Cawley held the position of Sanitary Engineer, New York Engineering Department of Rayonier, Inc. During most of this period he was on special assignment at the Jesup, Ga. Division of Rayonier where he was in charge of waste disposal studies and operations. Prior to the 1954-55 school year during which he was in the graduate school at M.I.T., he was a Sanitary Engineer on the staff of the Massachusetts Department of Public Health.

During both World War II and the Korean War, Mr. Cawley saw active duty with the Navy in various parts of the world and now holds a commission as Lt. Commander in the U.S. Naval Reserve.

Mr. Cawley has written on "The Metabolism of Single Carbon Organic Compounds by Activated Sludge," "An Improved Dilution Method for Flow Measurements," "An Effect of Biological Imbalance in Streams" and "Lagooning of Chemical Cellulose Wastes." He is a member of AWWA, FSIWA, ASCE, Amer. Soc. for Limnology and Oceanography, Sigma Xi and Pi Eta.

A Correction

to page 325 of the August number of *Water & Sewage Works* is called to the attention of our readers.

A letter to the Editor, from Dr. Rolf Eliassen, Prof. of Sanitary Engineering at Mass. Inst. of Tech., Cambridge, Mass., says, "In the August 1958 issue of your magazine, there is a report of the technical papers read at the AWWA Convention in Dallas last April. The paper which we presented entitled, Experimental Performance of 'Miracle' Water Conditioners, was among those on which your magazine reported. On the whole, this is an excellent and succinct summary of our article.

"However, your reporter used the word 'hoax' to characterize the devices which we studied by means of scientific tests. This word was not used by Messrs. Eliassen, Skrinde and Davis in the article or in its presentation before the American Water Works Association."

Water & Sewage Works is sorry that the reporter, engaged to cover the particular session at which Dr. Eliassen spoke, reported incorrectly on Dr. Eliassen's presentation.

Do you want

bound copies of either the AWWA Journal or the APHA Journal. When L. L. Hedgepeth died he left a set of both of these Journals extending back several years. Mrs. Hedgepeth would like to dispose of these volumes. If you are interested write to the editor of WATER & SEWAGE WORKS.

Hunter Pres. Rocky Mount. Section

John M. Hunter, superintendent of the Cheyenne, Wyoming, filter plant, has been elected president of the Rocky Mountain section of the Sewage and Industrial Waste Association. He succeeds Howard V. Lewis, superintendent of the Coors Brewery waste treatment plant at Golden, Colorado.

Also named were Benjamin V. Howe, Denver consulting engineer, as vice president, and Art Williamson, Cheyenne Wyoming, State Sanitary Engineer, to the board of trustees.

D. P. Backmeyer

Superintendent, Sewage Treatment Plant, City of Miami, Florida, became a Contributing Editor of *Water & Sewage Works* on January 1.

Mr. Backmeyer was born in Richmond, Indiana, and received his A.B. degree from Wittenberg College in 1935. He studied for a chemistry masters at the University of Michigan, and became Chief Chemist, Sewage treatment plant at Richmond, Indiana, in 1936. In 1940 he became Superintendent of the Sewage treatment plant at Marion, Indiana, and later became Superintendent of both Water and Sewage treatment. He was Superintendent of the Little Miami Sewage Plant in Cincinnati from 1952, until he joined the City of Miami, Fla., as Superintendent of the Sewage treatment plant.

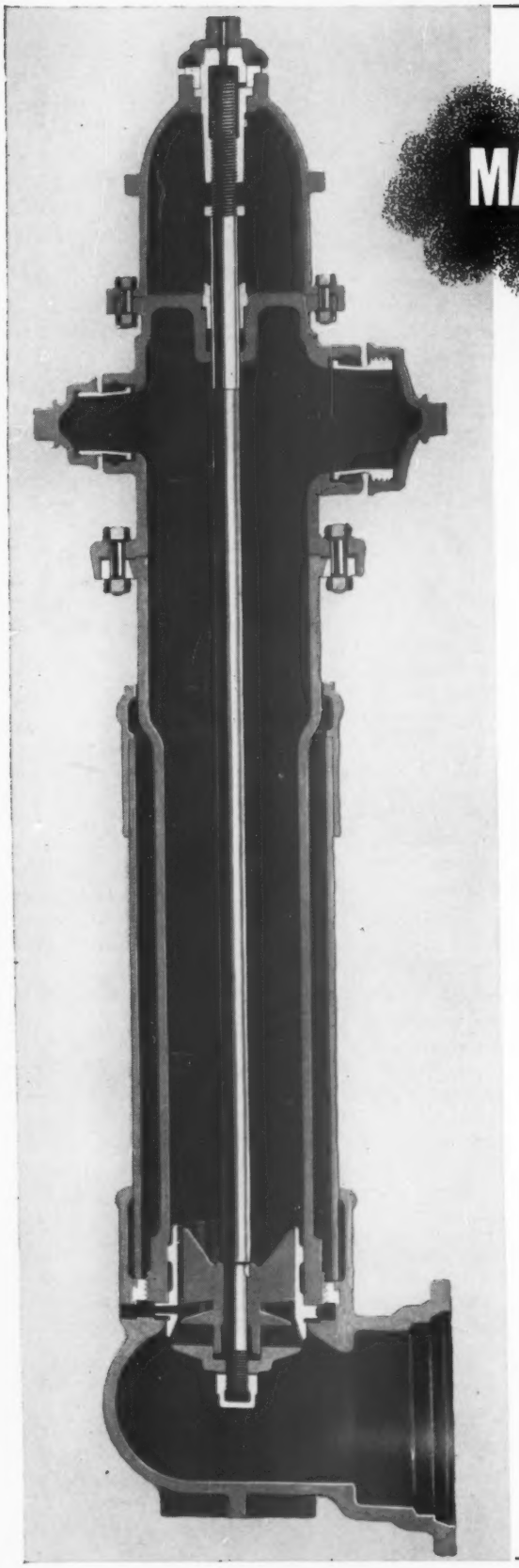
He is a member of the American Institute of Chemists, and the Florida Sewage & Industrial Wastes Association. Mr. Backmeyer received the G. B. Gascoigne Award in 1948. He is also well known for his published articles on sewage treatment.

Front Cover

After 75 years of only moderate industrial growth, Springfield, Ohio, has achieved its dream of an adequate water supply and treatment facilities.

Designed to treat ground water supplies, the new 36 mgd plant concludes a success story in the water works field. Black & Veatch, Kansas City, Missouri, were the Consulting Engineers on this plant.

CONTINUED ON PAGE 9A



MATHEWS HYDRANTS

THE MATHEWS MODERNIZED HYDRANT SUPPLIES THE 4 FUNDAMENTAL REQUIREMENTS FOR EFFECTIVE COMMUNITY PROTECTION

and many other quality features, too

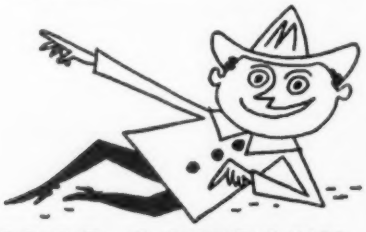
Replaceable barrel for maximum efficiency—quickly replaced in case of accident without excavating

Head revolves 360°; simply loosen bolts and rotate

Stuffing box plate cast integrally with nozzle section—eliminates extra part and provides positive, leakproof construction

Operating thread, protected by stuffing box plate, operates free of rust, sediment and ice

Also . . . Nozzle sections supplied with hose or pumper outlets as specified • Operating thread cannot be bent • Compression-type main valve prevents broken Mathews from leaking • Nozzle level can be raised or lowered without excavating • Bell, mechanical-joint, or flange-type pipe connections • Conventional or "O" ring packings



Made by

R. D. WOOD COMPANY

Public Ledger Building, Independence Square, Philadelphia 5, Pa.

Manufacturers of "Sand-Spun" Pipe (centrifugally cast in sand molds) and R. D. Wood Gate Valves

News—Here & There

CONTINUED FROM PAGE 7A

Perry A. Cessna

Supt. of Sewage Treatment, Bradenton, Fla. was honored at the joint meeting of the Florida Section, AWWA and the Florida Sew. & Ind. Wastes Assn. in October in No. Miami Beach, where he was presented the "LeRoy Henry Scott Memorial Award" as the operator who had brought recognition to his city by virtue of his work and operation of the sewage treatment plant.

R. W. Haywood, Jr.

has joined the Washington Suburban Sanitary Commission, at Hyattsville, Md., as Research and Development Engineer. Prior to his joining the Commission, Mr. Haywood was a Con-Du Pont De Nemsultant to the E. I. ours & Co., Inc., Engineering Service Division, Engineering Department, Wilmington, Delaware. He specialized in water treatment.

Incodel

the Interstate Commission on the Delaware River Basin held a two day conference at Atlantic City early in October. The conference marked the 21st year of service by the Commission, comprised of a group of governmental officials from the States of New York, New Jersey, Pennsylvania and Delaware.

The conference featured the annual report by the chairman, Francis A. Pitkin, Penna. Dept. of Commerce and reports on the Basin water pollution abatement program by James H. Allen, executive secretary of Incodel; Sylvan C. Martin, U. S. Public Health Service; Harold L. Jacobs, State of Delaware Water Pollution Commission; Dr. Matthew Hohn, Phila. Academy of Natural Sciences; and Dr. George R. Jenkins, Lehigh University. One of the sessions included addresses by representatives of the Army Corps of Engineers, the U. S. Dept. of Commerce, the Exec. Dept. of the Federal Govt., and others interested in the general problem of the area.

Benjamin B. Ewing

has been appointed Associate Professor of Sanitary Engineering, the Department of Civil Engineering, University of Illinois.

Professor Ewing received B.S. and and M.S. degrees in Civil Engineering from the University of Texas in 1944 and 1949, respectively, and is now completing work on his doctoral thesis for the PhD degree in Sanitary Engineering from the University of California. He was on the faculty of the University of Texas from 1947 to 1955. He was on the faculty of the University of California from 1955 to 1958 while studying for the doctor's degree.

In addition to the research work for his master's degree on bulking of activated sludge, Professor Ewing has participated in studies dealing with the concentration of uranium from sea water by trickling filters and control of aquatic weed in water reservoirs. His doctoral thesis is on the uptake of cesium by soil in connection with the disposal of high-level radioactive wastes by underground injection.

Professor Ewing is a member of Sigma Xi, Chi Epsilon, Delta Omega, American Society of Civil Engineers, AWWA, and FSIWA.

N. L. Nemerow

Dr. Nemerow has been appointed Professor of Civil Engineering at Syracuse University, Syracuse, N. Y.

Professor Nemerow was formerly Associate Professor of sanitation engineering at North Carolina State, and senior sanitation engineer with the North Carolina State Sanitation Committee.

He is now chairman of the Sanitation Engineering Division of the American Society of Civil Engineers, and is conducting research on oxidation ponds.

Water Resources Law

The University of Michigan Law School, Ann Arbor, Mich., has published Water Resources and The Law, from the 1957 Summer Institute of The University Law School.

This volume contains contributions of participants in the Institute, monographs by staff members of the Legislative Research Center, and a Model Water Use Act, prepared by the Legislative Research Center under the directorship of Professor William J. Pierce.

The book is priced at $5.00, and orders should be addressed to: Michigan Legal Publications, in care of the University Law School.

Philic to Phobic

is the correction to the radical in this illustration published in the October 1958 article on "Synthetic Detergents" page 427 by Ross McKinney and James Symons. The radical of the typical syndet molecule has hydrophobia.

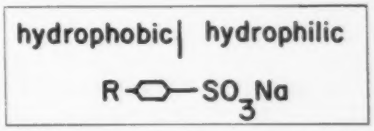


FIG. 3—THE SURFACE properties of a typical syndet molecule are indicated by this formula.

Great Lakes Data

Investigators from the University of Michigan Great Lakes Research Institute have compiled, for the first time, a listing of hundreds of agencies collecting data in the Great Lakes.

The investigators contacted all available agencies in the U. S. and Canada where limnological and meteorological information concerning the Great Lakes might be obtained. The study was financed by a grant from the U. S. Fish and Wildlife Service.

They looked for and recorded where records are located that pertain to:

1. Water temperature, color and odor;
2. Chemical and biological analyses of Great Lakes Water;
3. Water level and lake surface condition; and
4. Numerous meteorological observations such as air temperature, precipitation, wind speed and direction, humidity, radiation, evaporation, pressure, visibility, and cloud cover.

Up to the present time, little was known, specifically, about the avail-

CONTINUED ON PAGE 11A

No other flow meter gives you the accuracy, convenience and economy of the new Honeywell Bellows Flow Meter

- **Calibrated accuracy ± 0.5% of full scale**
- **Leakproof between liquid fill and process fluid**
- **No mercury to contaminate process fluid**
- **No zero shift between —40 and +250°F**
- **Fast range changing in field; choice of fifteen ranges**
- **High corrosion resistance**
- **Fast, accurate damping adjustment**
- **Meter body is self-venting, draining or purging**

Here's the most advanced meter body available today for flow and liquid level metering. You can use it with virtually any process fluid, with combustible fluids, and in hazardous atmospheres. Meter body has connections for either vertical or horizontal piping. Remove it from the system for servicing without disturbing the piping.

Models available in many ranges, for both flow and liquid level measurement and control. Call your nearby Honeywell field engineer for details on the new Honeywell Bellows Meter. He's as near as your phone. Or write for Catalog C22-1.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

- **Reference Data: Write for Catalog C22-1 "Bellows Flow Meter".**

Honeywell

First in Control

News—Here & There

CONTINUED FROM PAGE 9A

ability, reliability, and extent of the above mentioned data.

The Institute Investigators will now check the sources for usefulness of these data by conducting a pilot study in a selected section of the Great Lakes in which available data can be examined.

Fla. Sect. AWWA

officers elected for the ensuing year at the annual meeting in October were:

Chairman: David B. Lee, State Dept. of Health, Jacksonville.

Vice Chairman: Harvey T. Skaggs, Amer. Burnett Chem. Co., Jacksonville.

Secy.-Treas.: J. G. Simmons, West Palm Beach.

Director: Fred A. Eidsness, Cons. Engr., Gainesville.

Fla. S & I W A

officers elected for the ensuing year at the annual meeting in October were:

President: Sidney A. Berkowitz, Fla. State Bd. of Health, Jacksonville.

Vice President: Clifford M. Courson, Bur. of San. Sewers, Tampa.

Secy.-Treas.: Arthur R. Finney, Jr., The Mackel Co., Coral Gables.

Director: David B. Smith, Cons. Engr., Gainesville.

Operator's Forum

In formulating the Operators' Forum, that was presented at the Annual FSIWA Convention in Detroit, letters were sent to 84 plant operators located in 27 different states, requesting that they list two subjects, not concerned with maintenance, as topics for discussion.

Replies containing 108 subjects for discussion were received from 54 treatment plant operators. Subject interest, as indicated by topic frequency, was centered in Sludge Digestion, Sludge Disposal, Skimmings and Scum Removal and Final Disposal, Sewage Sampling, and Treatment Plant Operator Certification.

Building Dedication

The Texas State Board of Health recently dedicated the new State Department of Health Building, located at 1100 West 49th St., Austin, Texas.

Chemical Denudation Studies

The U. S. Department of the Interior, has instituted a program of collecting streamflow data and two-liter samples of water from some 65 major rivers of the world. This is part of a worldwide effort to learn how much water flows into the oceans and how much of the land these rivers carry off as dissolved solids.

"Chemical denudation," the dissolving of mineral matter from the rocks and soil, is a natural process that is as much a part of the continuous erosion of our land masses as is the transfer of silt and other suspended materials.

Scientists engaged in certain studies in the field of geochemistry and hydrology have been hampered for many years by a lack of adequate quantitative data on river-borne dissolved chemical substances. Yet these data are becoming increasingly important in newer technical concepts, such as total water budget, the relationship of runoff to precipitation, or the effect upon the earth of salt being carried to the sea.

For dissolved solids the best available estimates of the total amount carried by the rivers, dumping about 18 billions of water a minute into the oceans, range from 280,000 to 450,000 tons an hour. The work of collecting new and meaningful data has been assigned to a "Committee of World-Wide Runoff of Dissolved Solids" appointed from members of the International Association of Hydrology of the International union of Geodesy and Geophysics. Principal coordinator is Walton H. Durm, chemist in the Geological Survey's Water Resources Division, appointed by former Hydrology Association President J. T. Thijsse of The Netherlands to work with four other Committee members from abroad who are coordinating the efforts of hydrologists from 30 countries.

Sewage Plant Dedication

On June 18, 1959, The Metropolitan Sewage Disposal System, composed of the City of Cincinnati and 26 participating Political Subdivisions will dedicate the Mill Creek Sewage Works. This is a $26,000,000 project; part of the overall $59,000,000 program for pollution abatement.

At the dedication exercises, the City will honor H. S. Morse and Harrison P. Eddy, who, in 1912, guided the early engineering developments which were instrumental in the adoption of the present program. Also to be honored are Fred H. Waring, Chief Sanitary Engineer of the State Department of Health of Ohio and Frank C. Tolles, former partner of Havens & Emerson, Consulting Engineers.

The Ohio Sewage and Industrial Wastes Treatment Conference will participate in the dedication while meeting in Cincinnati at the Netherland Hilton Hotel on the 17, 18, and 19th of June.

Plastic Pipe Panel

The Society of Plastics Engineers, during their recent meeting in Los Angeles, Calif., held a panel on Plastic Pipe. Among the subjects discussed were: Polyethylene pipe; ABS pipe; and PVC pipe.

Abstracts of some of these papers are now available and may be procured by writing: Lloyd Dickson, Publicity Chairman, Houghton Laboratories, 5920 Smiley Drive, Culver City, Calif.

Coming Articles

Subterranean Water Collectors	H. B. & J. H. Fehlmann
Instrumentation and Control in Waste Water Treatment	W. H. Brown
Meters Solve Water Crisis	L. M. Owen
Chlorination Guide—Part III	E. J. Laubusch
Meeting Water Needs	J. B. Thompson
Safety Practices	R. L. Lawrence
Public Relations	D. J. Suarez
Mechanism of Corrosion	A. G. Keller
Regulation of Water Resources	A. Wolman
Planning Water Supply Resources	J. E. Kiker
Elevated Tank Maintenance	E. D. Barrett
Centrifugal Pumps	P. Ziemke
Sewer Extensions	Sarza, Sultenfuss, Haneman
Industrial Wastes—Part II	T. Jaffe
Symposium on Water Works Management	Various

Here is one of the aeration tanks in Kewanee, Illinois, using the P.F.T. Dual Aeration Equipment. Crawford, Murphy and Tilly, Consulting Engineers, Springfield, Illinois.

Note P.F.T.'s removable aeration plates which permit service without shutdown.

Existing plant capacity doubled with P.F.T. Dual Aeration System

Can increased flow and loading be handled without additional aeration tank volume? Yes—with the P.F.T. Dual Aeration System and P.F.T. Kraus Nitrification. In fact, at Kewanee, Illinois, existing aeration tanks were originally designed for 1.0 MGD flow and are now capable of handling flows up to 2.0 MGD.

This P.F.T. Aeration System includes the P.F.T. Valved-Orifice Air Distributors and Removable Plate Diffusers.

If you would like full information about P.F.T. Dual Aeration System and other P.F.T. equipment, write us today.

The aeration tanks are also arranged to use P.F.T. Kraus nitrification for "Controlled Activated Sludge" operation.

Waste Treatment Equipment
Exclusively since 1893

P.F.T.

PACIFIC FLUSH TANK CO.
4241 Ravenswood Avenue
Chicago 13, Illinois

PORT CHESTER, N. Y. • SAN MATEO, CALIF. • CHARLOTTE, N. C. • JACKSONVILLE • DENVER

Equipment News

Midget Tester For Iron Content

101

W. A. Taylor & Co., Baltimore, Md., has introduced a new Midget Iron tester, designed for fast, easy and

accurate determination of iron content in water and brine.

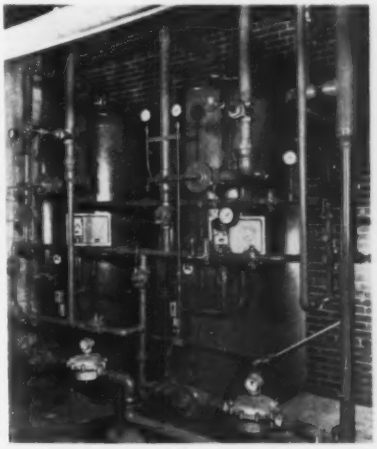
Compact and rugged, the testing unit consists of eight color standards to cover the 0-10 ppm iron range housed in a transparent plastic block, a glass comparison cell, two reagents with droppers, a mixing tube, cell cleaner and complete instructions for use. The range of the color standards can be extended by diluting the sample with iron-free water.

Tests for total iron are made simply by filling the mixing tube with the water or brine to be tested, and adding the reagents. After allowing this solution to stand for 15 minutes, it is placed in the tester block and compared with the color standards. Values are then read directly from the standards. All Taylor liquid color standards carry an unlimited guarantee against fading—assuring accurate determinations.

Automatic Valve Arrangement For Water Softeners

102

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has developed a new automatic, multiple valve arrangement for users of industrial, institutional and utility water softener systems. This system uses individual, hydraulically operated valves which open or close automatically as required to regenerate the system. The individual valves mean easier maintenance at lower cost. Also newly available are manual pilot valves for fingertip control of large hydraulic valves in manual multiple valve systems.



The two valving systems previously provided by A-C were the manual system, employing either the single multiport valve or multiple manual

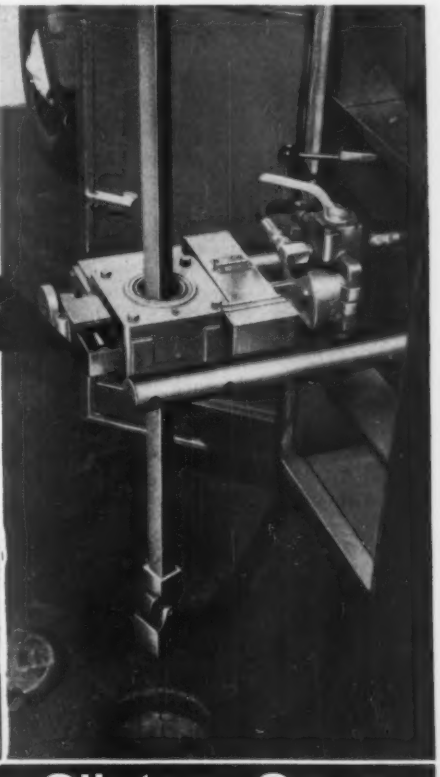
CONTINUED ON PAGE 15A

Truck models operate from truck transmission ... portable units from 3 to 7½ h.p. Save time ... reduce cost ... improve maintenance.

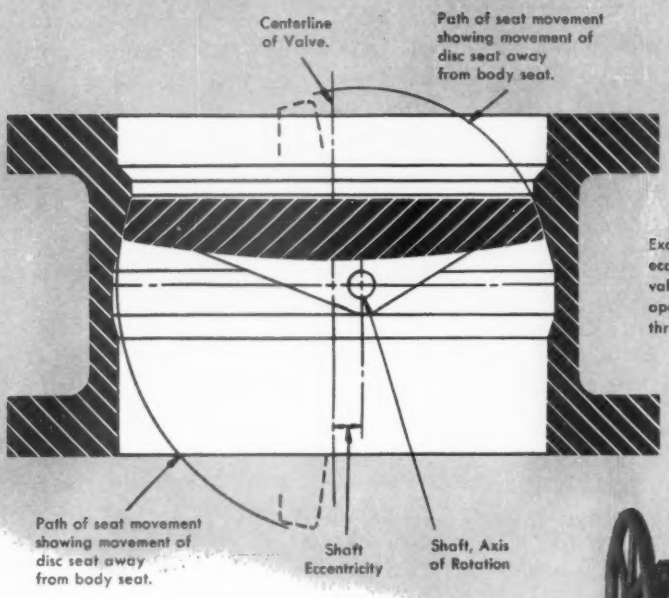
hitch horse sense to horsepower

Make every valve POWER OPERATED...

New fluid drive all-hydraulic, centralized-control, PAYNE DEAN valve operators.

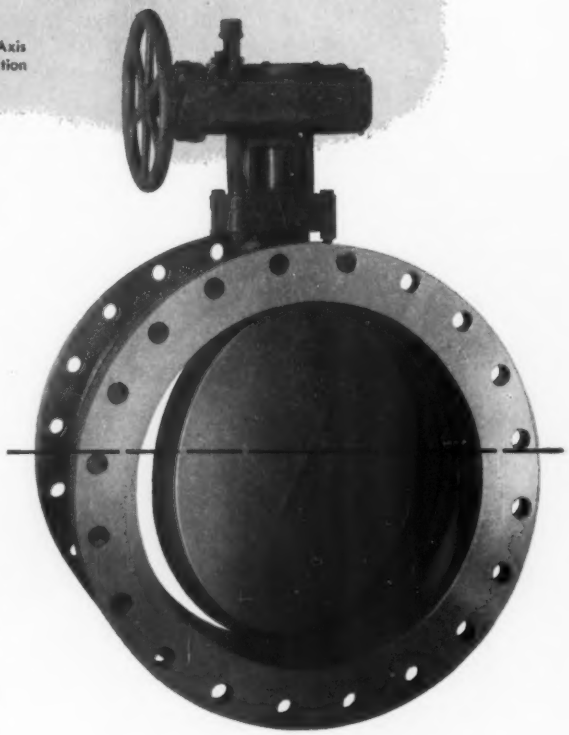


Payne Dean & Company Clinton, Conn.


Centerline of Valve.
Path of seat movement showing movement of disc seat away from body seat.
Path of seat movement showing movement of disc seat away from body seat.
Shaft Eccentricity
Shaft, Axis of Rotation

Exaggerated diagram showing eccentricity of valve shaft in relation to valve axis and how the disc, upon opening, is lifted from the body seat throughout its entire circumference.

How **DARLING-PELTON BUTTERFLY VALVES** lick common problems!

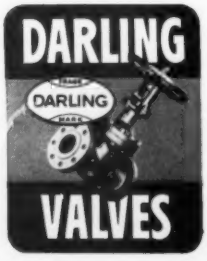


Problem No. 1—COMPLETE SHUTOFF. With a continuous, 360 degree, rubber sealing ring, uninterrupted by the valve shaft, *drop-tight* shutoff becomes possible!

Problem No. 2—SEAT LIFE. With the valve disc swinging on an axis eccentric to the valve centerline, the disc lifts away from the body seat upon opening—abrasion and distortion are avoided. Moreover seat life is further prolonged by easy, compensative adjustment.

Problem No. 3—MAINTENANCE. Minimized and simplicity itself due to the unique seat ring principle. No sealing problem around the shaft. The rubber seat is replaceable in or out of the line without dismantling the valve!

Get *all* the facts on performance, sizes and constructions made to A.W.W.A. Specifications. Send for Bulletin SLS-5708.



DARLING VALVE & MANUFACTURING CO.

Williamsport 11, Pa.

Manufactured in Canada by The Canada Valve & Hydrant Co., Ltd., Brantford, Ont.

Equipment News

CONTINUED FROM PAGE 13A

gate valves, and the automatic system which utilizes an automatic multiport valve.

This new hydraulic valving system shows promise for use in widespread application and should have special appeal in the development of deionizing systems.

"Job-Planned" Water Dept. Truck Bodies

103

Reading Body Works, Inc., Reading, Pa., has designed two new truck bodies "job-planned" for water line maintenance service, for delivery to the Indianapolis, Ind., Water Company.

The bodies are mounted on dual-wheel, 2½-ton Dodge chassis and are used by the company to maintain water lines, valves and fire hydrants.

Both vehicles have roller-bearing mounted telescopic roofs and seats inside the body for work crews.

A generator and pump are mounted in compartments in each body. The generator supplies power to lighting night operations and for small electrical tools. The pump is used to empty water filled trenches. A heavy-duty air compressor, installed inside the body, supplies air for pavement breakers and other equipment.

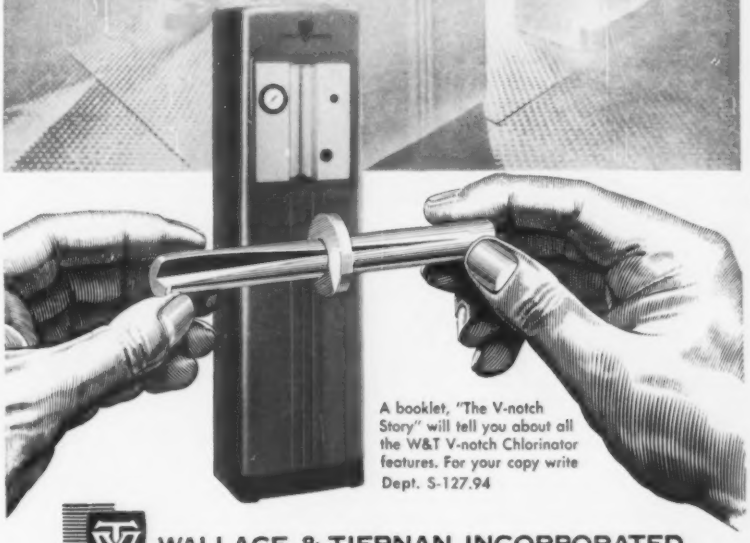
Watertight compartments with divided shelves, bins and trays provide storage for digging tools, hoses, valve parts, plumbing equipment and other tools. A pipe vise and a mechanic's vise are mounted on the rear platform.

One of the bodies has a heavy-duty arm derrick mounted on its rear platform. It is used to lift valves in and out of the truck.

CONTINUED ON PAGE 17A

the V-notch
is the difference
in chlorine control

Safe chlorine control is the job of a chlorinator.
This control, the V-notch, does the job completely.
Yet it appears to be simply a grooved plug in a ring.
It is, of course, more than that. . . much more.
The groove in the plug is precision milled and shaped so that when you turn the control knob on your chlorinator and the plug slides through the ring, the size of the opening between the groove and the ring changes an exact amount. You meter chlorine exactly and simply because every position of the plug in the ring makes a repeatable orifice size—a repeatable chlorine flow rate.
Only in a W&T V-notch Chlorinator is control so simple, so true, so precisely right.
And, of course, the right plastics make the whole chlorinator chlorine-proof.



A booklet, "The V-notch Story" will tell you about all the W&T V-notch Chlorinator features. For your copy write Dept. S-127.94

WALLACE & TIERNAN INCORPORATED
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

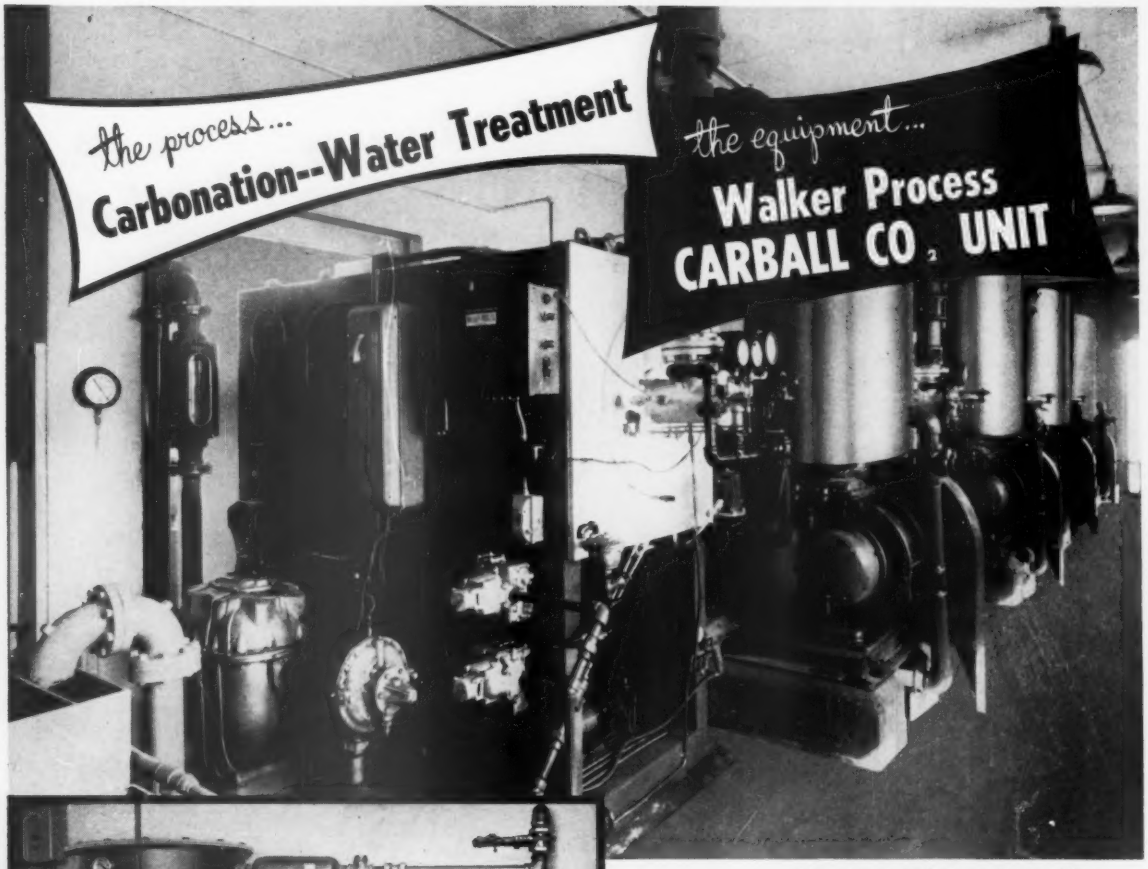
W&T DRY CHEMICAL FEEDERS

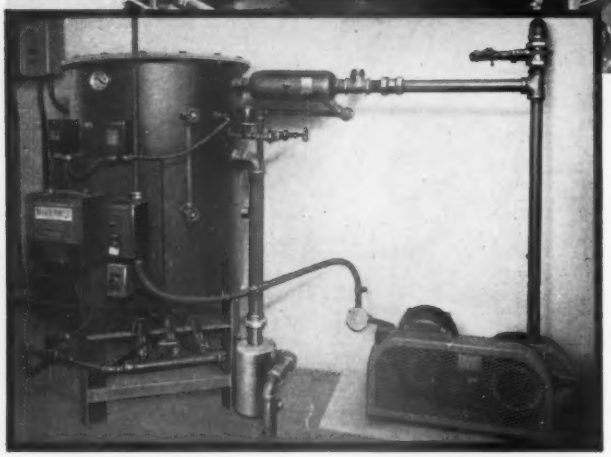
For Accurate Feeding Of Water Treatment Chemicals

Full line of wide range dry chemical feeders capable of controlling a few ounces to 3000 lbs. per minute.

Write for Bulletin M-38 for complete Dry Feeder information.

WALLACE & TIERNAN INCORPORATED
25 MAIN STREET, BELLEVILLE 9, NEW JERSEY





Four size 4 Carballs at Kansas City, Mo. burn either gas or oil to produce max. of 40,000 lbs. CO_2/day. Size "O" unit at left produces 570 lbs. CO_2/day for Jefferson, Iowa Water Plant.

CARBALL
CO_2 UNIT

Walker Process now offers carbonation units for all lime softening plants from the very small to the largest. Sizes range from the new "OO" unit with minimum capacity of 55 lbs. CO_2/day to the No. 4 at maximum output of 10,000 lbs. CO_2/day.

Engineers can readily provide an entire carbonation system by simply specifying the appropriate size CARBALL in combination with Walker Process SPARJER diffusers . . . . . assuring

50% More CO_2
Clean, Tasteless Gas
100% Combustion
Unique Absorption Method
Economical Operation
Factory Tested Package System

Write for bulletins 7W83 - 7W85 and 7W88

WALKER PROCESS

WALKER PROCESS EQUIPMENT INC.
FACTORY • ENGINEERING OFFICES • LABORATORIES
AURORA, ILLINOIS

Equipment News

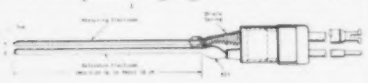
CONTINUED FROM PAGE 15A

The bodies are fabricated from heavy gauge cold rolled steel and have all standard Reading construction features, including welded seams, 3/16" safety tread steel floor, structural steel cross sills and undercoating.

Miniature pH Electrodes

104

Leeds & Northrup Co., Philadelphia, Pa., has introduced a new miniature pH electrode assembly for use with samples ranging in size from one



drop up. The two electrodes, reference and measuring, can be inserted in an opening of 7 mm dia, and a flexible electrode support then permits the user to squeeze the two elements together and thus accommodate the single-drop sample, as for instance in the tip of a centrifuge tube. Self-shielding of the measuring electrode is said to eliminate the compartmental shielding usually required and avoids the need for sample transfer. Use of the assembly is not limited to small samples, however; it may be used at any electrode immersion of 10 cm or less. The pH range is 1 to 11.5; temperature range for sample is 15 to 40 C. The measuring instrument recommended by the maker of use with this electrode is L&N No. 7664 pH Indicator.

The electrodes are said to resist breakage because of their flexible mounting, and the outer tube of either electrode may be replaced inexpensively if broken. The internal electrode elements are permanent parts of the head assembly. The reference electrode holds several days' supply of its 2N KCl solution, and quantities of both this solution and of buffer solution for the measuring electrode are shipped with the assembly.

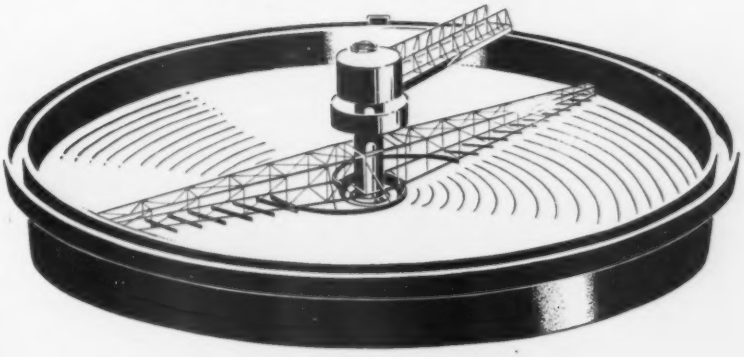
Jr. Emergency Pipe Clamp

105

M. B. Skinner Co., South Bend, Ind., has just introduced the Junior Emergency Pipe Clamp, a companion

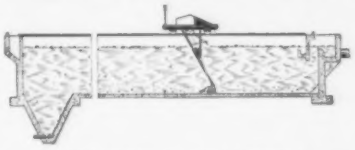
CONTINUED ON PAGE 19A

WATER, SEWAGE AND TRADE-WASTE TREATING EQUIPMENT



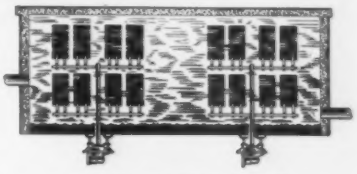
● CIRCULAR CLARIFIERS

Hardinge Circular Clarifiers are available in sizes up to 200' diameter, either center-column or beam supported for steel, concrete, wood or tile tanks. Sludge scrapers remove settled solids rapidly through central underflow discharge.



RECTANGULAR CLARIFIERS

Especially suited for limited spaces or where sludge delivery is desired at one end of the tank. A traveling scraper and skimmer carriage removes settled solids from the tank bottom and scum from the top.

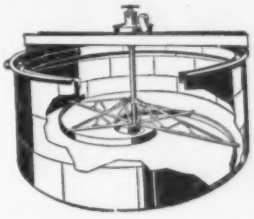


FLOCCULATING UNITS

Slowly rotating paddles on vertical shafts bring the small flocs into contact to form larger masses and hasten precipitation.

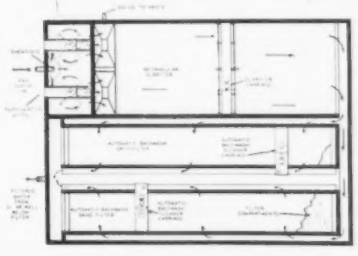
HYDRO-CLASSIFIERS

A large-volume classifier for rapid separation of coarse and fine suspended solids. Frequently used for by-product recovery from waste water.



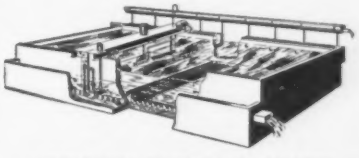
"AUTO-RAISE" THICKENERS

For removal of fine suspended solids from supply water, waste water and sewage. "Auto-Raise" mechanism prevents scraper breakage. Manual or power raise supplements "Auto-Raise." Replaceable ring-type ball bearing support for rotating mechanism. Spiral rakes for maximum underflow density.



COMPLETE WATER SYSTEM

Hardinge also offers a complete water treating unit, combining flocculating equipment, clarifiers and filters in one, common-wall system, using modular construction.



AUTOMATIC BACKWASH FILTERS

For high removal of non-settling or slow settling suspended matter. Self-cleaning sand bed. No shut-down necessary for backwashing. Traveling backwash mechanism.

HARDINGE COMPANY, INCORPORATED

YORK, PENNSYLVANIA • 240 ARCH ST. • Main Office and Works

New York • Toronto • Chicago • Hibbing • Houston • Salt Lake City • San Francisco • Birmingham • Jacksonville Beach

USCOFLOW PLASTIC PIPE

New black UscoFlow Utility plastic pipe and fittings provide economical corrosion resistance—inside and out

A blend of styrene-base resins and synthetic rubber to give good impact resistance and high, effective tensile strength...

A simple installation—rapidly solvent welded...

A friction-free finish that maintains high flow-rate and resists build-up of scale or other deposits...

An economical price to solve corrosion and high installation cost problems that would ordinarily chew into your profits...

All this is the *new* UscoFlow line of black plastic pipe and fittings, specially designed for economical and efficient handling of fluids. It has already proven its long service life, free of maintenance and downtime, and is recommended for such applications as

salt-water lines **fresh-water lines***
natural-gas lines **electrical conduit**

• • •

When you think of plastic, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality plastic pipe and fittings.

*Uscolite is approved by the National Sanitation Foundation for use with potable water.

Mechanical Goods Division
United States Rubber
WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS
Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

Equipment News

CONTINUED FROM PAGE 17A

to the old reliable Emergency Pipe Clamp that has served industry for a half-century. The Junior is made up in a single bolt width, instead of two bolt width, and is only 2⅞" wide.

Like the Emergency Pipe Clamp,

it is made of malleable iron, it has a full length hinge along one side, a single oversized plated bolt on the other. The "top" half is a little narrower than the "bottom" or gasket half of the clamp. New feature—the lug on the gasket half is slotted—for quick "bolting." This makes it far more simple to apply than a "band" clamp. The "recessed" pressure-equalizing gasket, covering the entire bottom half of the clamp, is cemented in.

Installation is astonishingly quick. Just place the narrow or top half of the clamp on the pipe opposite the leak. Then hook the wide gasketed half on the hinge. Press this wide gasketed half against the leak—and bolt will automatically fall into place. Tighten nut and the job is done.

pH Meter

106

Hagan Chemicals & Controls, Inc., Pittsburgh, Pa., has developed a compact new line operated pH Meter, ideal for fast continuous service over a wide range of field and laboratory applications.

The electronic unit measures just 5½ x 6¼ x 2 inches, and is ideal for accurate determination of pH in raw, untreated, treated, potable, cooling and waste waters, boiler condensates and

CONTINUED ON PAGE 21A

Here's why more and more waterworks men are specifying

Sparling meters...

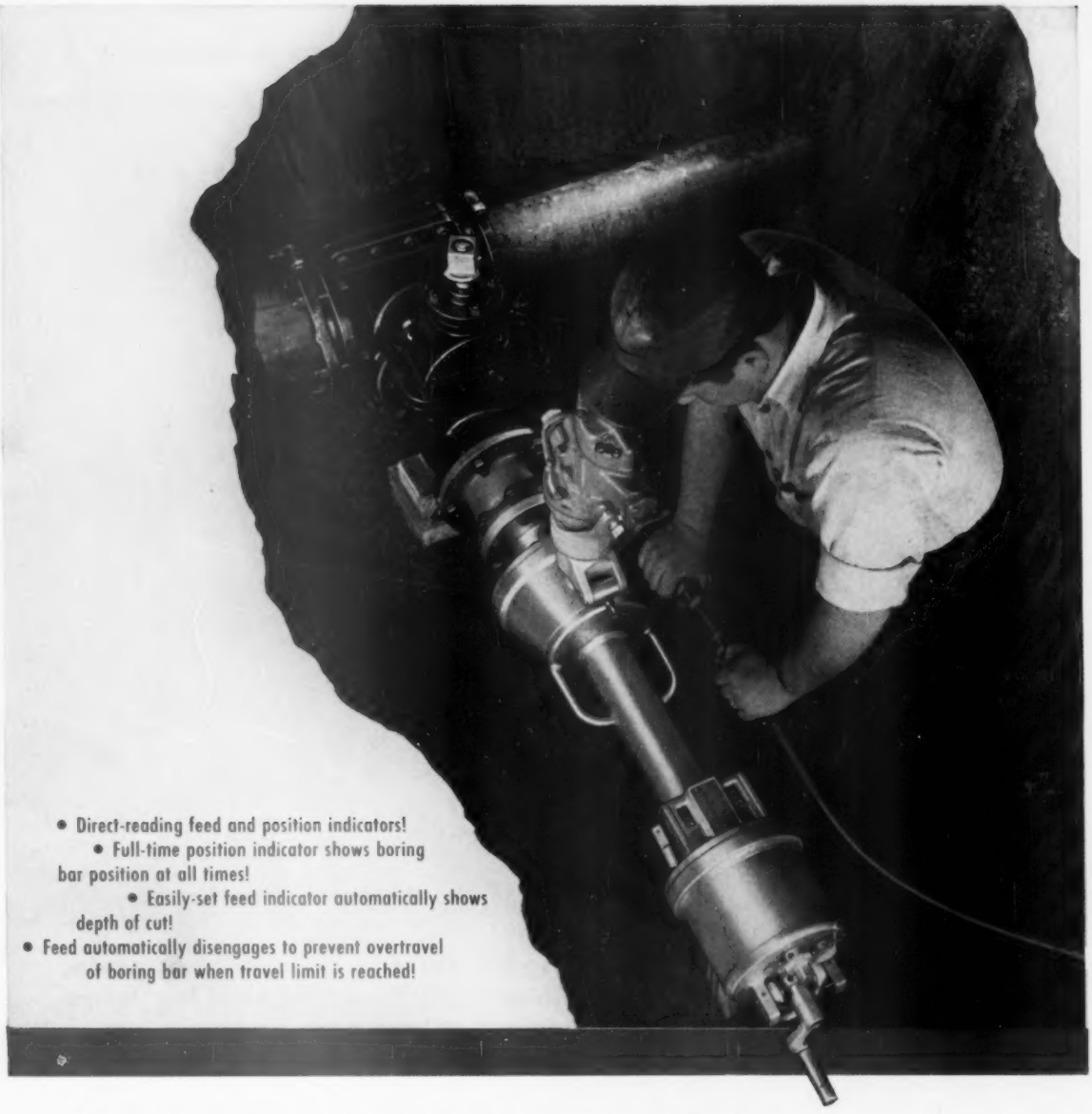
Sparling propeller meters are accurate, maintenance free and last for years

There are reasons for the increasing use of Sparling Propeller Meters. The main reason is that *totalization is Sparling's primary step*... after all, the usual purpose of metering is to determine the total amount of water. Rate indication and recording is Sparling's *secondary step*. Furthermore, with Sparling's free-flow design there is practically *no pressure loss*, an important economic consideration in flow measurement. Sparling meters are guaranteed accurate within 2% when properly installed. Finally, Sparling meters enjoy long life, free of any real problems of wear, incrustation, and corrosion. Recently, a 4-inch meter was "opened" for routine inspection, after 20 years of accurate service, and it showed no wear affecting accuracy. Start towards good metering now, write today.

Write for this informative brochure on the Sparling Line of Water Metering and Control Equipment. No obligation. Sparling Meter Company, 225 North Temple City Boulevard, El Monte, California.

Sparling meters

Other Sparling Offices: ATLANTA 3 • CHICAGO 4 • CINCINNATI 2 • DALLAS 1, TEXAS • DENVER 6 KANSAS CITY 6, MO. • ROSELLE, N. J. • SAN FRANCISCO 24 • SEATTLE 99 • TORONTO, CAN. • ROMFORD, ENG.


• Direct-reading feed and position indicators!
• Full-time position indicator shows boring bar position at all times!
• Easily-set feed indicator automatically shows depth of cut!
• Feed automatically disengages to prevent overtravel of boring bar when travel limit is reached!

Now! automatic ***cuts up to 12" with the***

NEW MUELLER® CL-12

Machine!

New design and new features give automatic operation for faster, safer cuts; more strength for reduced maintenance; simplified operation for use by inexperienced personnel; more compact for easier handling; and standardized tools for simpler tool selection.

Check with your Mueller Representative for complete details.

MUELLER CO. since 1857 SERVING the Water and Gas Industries QUALITY

MUELLER CO.
DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles, In Canada: Mueller, Limited, Sarnia, Ontario

Equipment News

CONTINUED FROM PAGE 19A

feed waters, and oil field blends and brines.

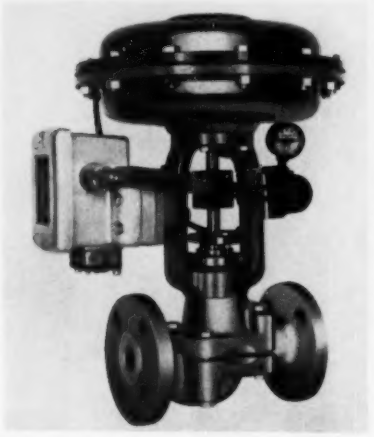
An auxiliary pointer permits convenient checking of standardization without need of buffer solutions between measurements. Three minutes after being plugged into a regular 100-125 volt, 50-60 cycle AC circuit, the meter is ready for operation.

Unlike simple colorimetric indicators, the meter covers a broad range of pH with high sensitivity. Color, turbidity or chlorine in test samples will not affect readings.

Control Valves

107

Uniflow Valve Corp., Cranford, N. J., has announced that the new Uniflow type 1000 control valve is a new concept in control valve design,



featuring a springless diaphragm. Complete with Foxboro or Moore Valve Positioners.

The springless diaphragm motor design is claimed to be superior to the piston type springless motor because it eliminates all friction in the motor, and requires less air pressure to operate and supplies greater force to the valve stem itself, making it ideal for single seated construction.

The newly designed split body is available in sizes one in. through 6 in. in steel, stainless steel, monel and Hastelloy "C", the springless single seated split body design provides stream line flow passage and elimi-

CONTINUED ON PAGE 23A

Costly waste, 20 gallons of water per minute

BEFORE

STOPPED with WATERPLUG Hydraulic Cement

Waterplug stops running water INSTANTLY!

AFTER

Here is what Underwater Services, Valley Station, Ky., had to say about Waterplug

On October 6, 1957, our Underwater Services Company was called upon to repair a major break in an underwater drainage system for the Hardin County Sportsmen's Lake at Elizabethtown, Kentucky. Upon diving to the bottom of the lake we discovered several large ruptures in the 24" tiles used in the drainage system. Water, uncontrolled, was pouring through these breaks at a minimum approximate rate of 20 gallons per minute. Using underwater diving equipment we managed to reduce this torrent by packing sandbags into the holes channeled through the four feet of earth covering these tiles. Descending through a water control tower, we gained access to the interior of the drainage tiles to the area of break-through. Above us were four feet of lake bottom and 20 feet of water above that. Under these extremely adverse conditions we used the Thoro System WATERPLUG Cement to repair the breaks from the interior of the tiles.

Because of the simplicity and ease of mixing and applying WATERPLUG Cement, we were able to completely and effectively repair these breaks in the drainage system.

We were delighted with the effectiveness of WATERPLUG Cement in successfully overcoming this difficult water repair problem. Feel confident that in future underwater repair problems, our company will rely upon WATERPLUG Cement.

"How to do it" GET OUR 16 PAGE BROCHURE

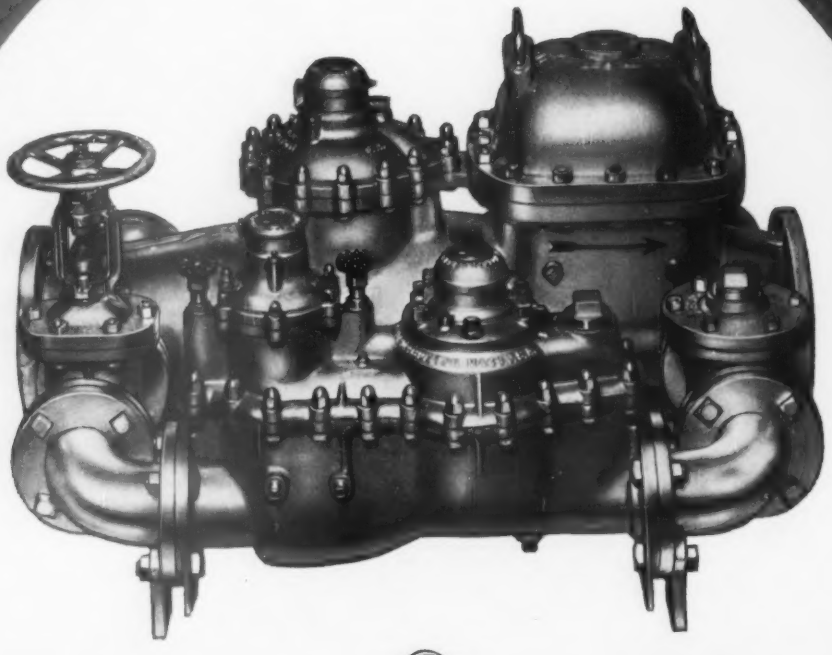
STANDARD DRY WALL PRODUCTS, INC.
NEW EAGLE, PENNA. CENTERVILLE, IND.

HERSEY

DETECTOR (Fire Service) METERS

Insure against loss of collectable revenue by accurately registering all rates of flow.

In emergency will deliver the full capacity of the supply pipe.



HERSEY 1859 1959 100 YEARS OF PROGRESS

HERSEY MANUFACTURING COMPANY

(Established 1859)

DEDHAM, MASS.

BRANCH OFFICES: NEW YORK — PORTLAND, ORE. — PHILADELPHIA — ATLANTA — DALLAS — CHICAGO
SAN FRANCISCO — LOS ANGELES

"YOU CAN'T BUY A BETTER WATER METER THAN HERSEY."

Equipment News

CONTINUED FROM PAGE 21A

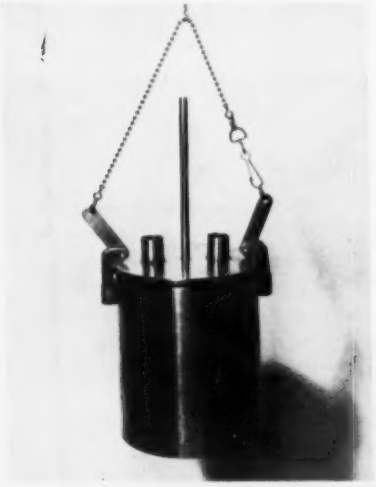
nates erratic pressure variations in flow stream. Pressure loses are concentrated at the flow area assuring accurate maximum flow rangeability.

Consecutive Sewage Sample Collector

108

Phipps & Bird, Inc., Richmond, Va., has available a compact one-piece unit for the collection of two consecutive sewage samples, in accordance with A.P.H.A. specifications.

The unit permits collection of dis-



solved oxygen, B.O.D. and other samples from streams, ponds, or tanks of moderate depth. It is constructed of brass. Rubber gasket and clamps assure an air tight closure.

Force Balance Transmitters

109

Bailey Meter Co., Cleveland, Ohio, has developed a new line of force balance transmitters which measure and pneumatically transmit flow, differential pressure, level, and specific gravity over wide ranges. Transmitters measure over a minimum range span of 0-2 inches H_2O under service pressures to 50 psig, to a maximum span of 0-2000 inches H_2O under service pressures to 5000 psig.

No viscous or other dampening devices are needed. Stability is maintained by a newly developed reset type booster relay.

When a pneumatic signal, varying linearly with rate-of-flow, is required for recording on the same chart with other linear quantities, or for integrating, and/or control purposes, the transmitter has a built-in square root extractor. This flow transmitter, which may be mounted directly on the process piping, is particularly useful as one element of a multi-element control system. Its linear rate-of-flow signal combines easily with pneumatic signals from other linear transmitters.

Portable, Pneumatic Conveyor

110

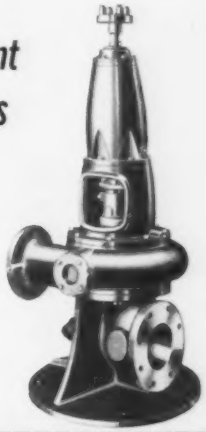
U. S. Hoffman Machinery Corp., New York, N. Y., has announced the Hoffco-Veyor, a new and versatile cost cutting potrable pneumatic system designed to keep materials on the flow.

Available in two standard models, No. 100 and No. 150, Hoffco-Veyors offers a proven new concept in material handling flexibility and are said to have provided an 80% saving in

CONTINUED ON PAGE 25A

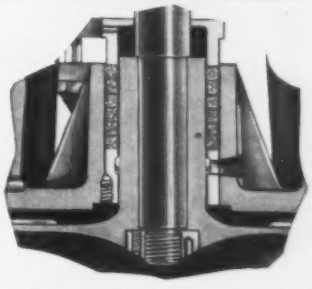
What to look for when you want low-maintenance sewage pumps

Wheeler-Economy, with half a century experience in the field, finds these are important features:



1. CLEAR, UNOBSTRUCTED, CAREFULLY DESIGNED WATERWAYS allow your pumps to pass exceptionally large rags, sticks, stones and solids without clogging. This 12" x 10" Wheeler-Economy Non-Clog Pump, for example, handles 7" solids easily.

2. NON-CLOG IMPELLERS reduce maintenance, too. This W-E Impeller, a two-blade, wide-waterway type, is locked to shaft with countersunk nut to prevent accumulation of rags, string, etc. Scraper blades are on back to prevent binding.



3. RENEWABLE BRONZE SHOCK ABSORBER prevents shaft deflection as stones or other objects enter impeller. When abrasive material is being handled, clear water connection minimizes wear on shock bearing, shaft sleeve and packing.

LIKE MORE INFORMATION? Ask for Catalog F-100, F-101 and 102, and E-101 describing Wheeler-Economy's complete line of sewage pumps. No obligation.

Economy Pump Division

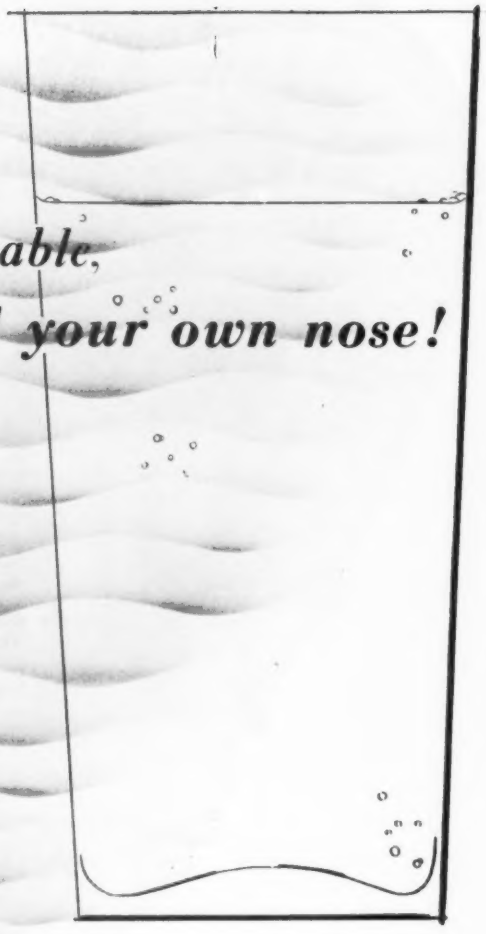
C. H. WHEELER MFG. CO.

19th and Lehigh Avenue • Philadelphia 32, Pa.

Whenever you see the name C. H. Wheeler on a product, you know it's a quality product

Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Steam Jet Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Products

to be sure
your water is always palatable,
it pays to look beyond your own nose!



Objectionable tastes and odors can frequently go undetected because operators become conditioned to plant odors.

So it is sound practice to make daily threshold odor tests to detect and accurately measure variations in water tastes and odors. Consistent PALATABILITY can then be assured with AQUA NUCHAR in controlled dosage to meet changing day-to-day conditions.

AQUA NUCHAR adsorbs all tastes and odors due to algae, decaying vegetation, trade-wastes and other causes. Properly applied, it is the only method that is universally effective. And because of the low concentrations required (as little as 2 to 5 ppm average) it is economical as well.

Our field technical service staff is available without obligation to make a threshold odor survey of your plant. For information write or phone us today.

AQUA NUCHAR
Activated Carbon for Taste and Odor Control

industrial CHEMICAL SALES
division west virginia pulp and paper company

230 Park Ave., New York 17 · Philadelphia National Bank Bldg., Philadelphia 7 · 35 E. Wacker Dr., Chicago 1 · 2775 S. Moreland Blvd., Cleveland 20

Equipment News

CONTINUED FROM PAGE 23A

labor costs and increased plant efficiency by 20%. Equipped with inlet valves to take standard size 1½ to 2 inch vacuum hose, Hoffco-Veyors can be used as vacuum cleaners when not in use as portable conveyors.

These units easily turn in their own length, can be wheeled to any location in the plant and immediately put to rials. They convey from 50 to 100 lbs work on otherwise hard to get at mateper minute continuously or intermittently depending on requirements. Where quantities exceed 7½ cubic ft, standard 55 gallon drums can be used as auxiliary collectors. Hoffman designed adaptor covers provide inlet and outlet connections. Adaptor covers are held in place by vacuum—can be shifted easily from one standard 55 gallon drum to others as needed.

Automatic Colorimetric Water Analysis

111

Florida Instrument Co., a division of Milton Roy Co., Philadelphia, Pa., has developed a new chemical analyzer that will for the first time make colorimetric water analysis simple and inexpensive for sewage plants and water works. Known as the Chemalyzer, this unit is the ultimate in design simplicity, with no moving parts and no electric or pneumatic power required for operation. Untrained operators will be able to make tests for alkalinity, residual chlorine, and water hardness that formerly required skilled technicians, and make them with foolproof accuracy in a fraction of the time formerly needed.

Sample water enters a reservoir at the top of the Chemalzer, where an overflow tube maintains a constant level. From the reservoir, sample then flows by gravity through an adjustable orifice to a sample metering chamber, where it slowoly rises to the top of a syphon tube. As soon as this point is reached, the entire contents of the metering chamber (19cc) are discharged by syphon action into a reaction chamber below. Flow rate through the adjustable orifice determines the testing rate of the instrument and can be regulated to automatically run from 4 to 60 reactions per hour. All phases of operation are easy to observe because the Chemalyzer is made almost entirely from transparent acrylic resin plastic.

Jar Test Agitator

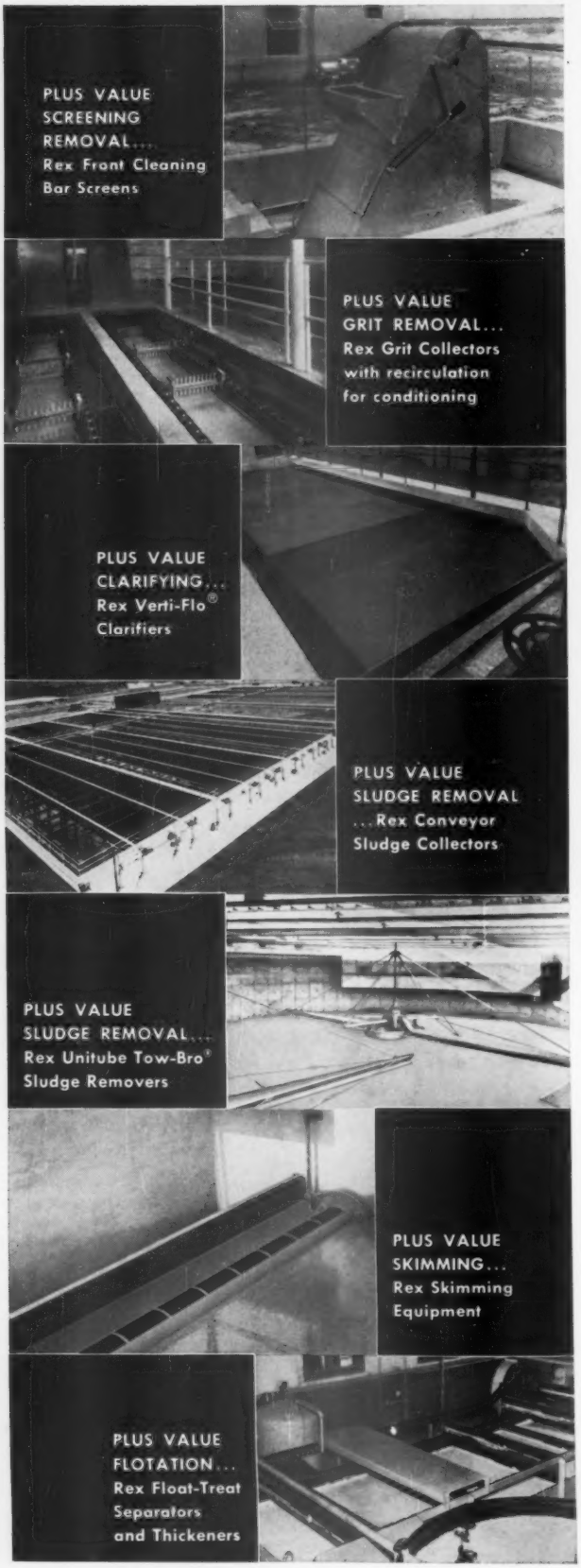
112

Water Products Co., Union, N. J., has announced the introduction of the "Floc-Stir" designed expressly for running jar tests. The paddle agitator has a speed range suitable for running coagulation tests for control of clarification or clarification and softening studies. The plastic paddle agitator, which is resistant to acids and alkalis, makes the "Floc-Stir" ideal for industrial waste treatment studies also.

Available either as a battery or line-operated unit, the "Floc-Stir's" compact size (6¼" x 4½" x 2½") makes it the ideal unit for field test work. It is also suitable for laboratory use, and its rugged construction insures years of dependable service. The "Floc-Stir" may be placed directly on the rim of a 600 ml or one liter beaker, and with the battery operated model

CONTINUED ON PAGE 30A

ALGAE-FREE WATER
MEANS
Copper Sulfate
treated water
Not only is Triangle Brand Copper Sulfate successful in controlling algae but it also is effective in killing some aquatic weeds. Since the weeds are submerged and disintegrated, there is no chance of them floating down stream to start new infestations, or to clog the waterway.
In sewage systems, Triangle Brand Copper Sulfate prevents roots and fungus from clogging pipes. However, there is no danger of affecting the surface trees owing to the low concentration of copper sulfate necessary to be valuable.
The new booklets "The Use of Copper Sulfate in The Control of Microscopic Organisms" and "Copper Sulfate for Root and Fungus Control in Sanitary Sewers and Storm Drains" will keep you up to date. Send for a copy today! Phelps Dodge Refining Corp., 300 Park Ave., New York 22, N. Y.
PHELPS DODGE REFINING CORP.
CHEMICALS



for PLUS value PERFORMANCE...

REX®

sewage and waste treatment equipment

What are the *plus values* you get in Rex Sewage and Waste Treatment Equipment that mean more efficient plant performance...lower operating and maintenance costs?

FIRST...*dependability!* Years of practical experience, a broad background of engineering knowledge, manufacturing skill, and the modern equipment that translates these into quality products combine to assure dependable operation under any condition.

SECOND...*efficiency!* Continuous research, product development and improvement...important pioneering in developing new methods and equipment to meet today's needs...add up to proven equipment that assures unequaled efficiency in performance.

THIRD...*economy!* Rex engineering leadership and modern manufacturing techniques make possible equipment that is less costly to install, easier to operate and maintain...over-all operating economy during the entire lifetime of the equipment.

FOURTH...*flexibility!* The broad line of Rex Equipment offers you the widest choice of equipment. There is a type and size to exactly suit the requirement. No need to buy more than you need...no need to take less than you want.

For complete data on the *plus values* in Rex Equipment, write CHAIN Belt Company, 4610 W. Greenfield Ave., Milwaukee 1, Wisconsin.

CHAIN BELT

Homestead Lubricated Plug Valves controlling digested sludge to vacuum filters.

Sewage plants make important savings in maintenance costs with Homestead Valves

Pump overloading resulting from restricted port area valves is eliminated by the 100% pipe area of Homestead Lubricated Plug Valves.

This, coupled with Homestead's controlled pressurized lubrication and positive chemical seal, results in years of trouble-free, low cost service. Study of your pipe lines will reveal many instances when Homestead Valves can help you achieve lower maintenance costs. Write today for complete information.

hv

HOMESTEAD VALVE MANUFACTURING COMPANY
P.O. Box 42 • Coraopolis, Pennsylvania

Please send me catalog on Homestead Lubricated Plug Valves. We are interested in this specific application:

.....

.....

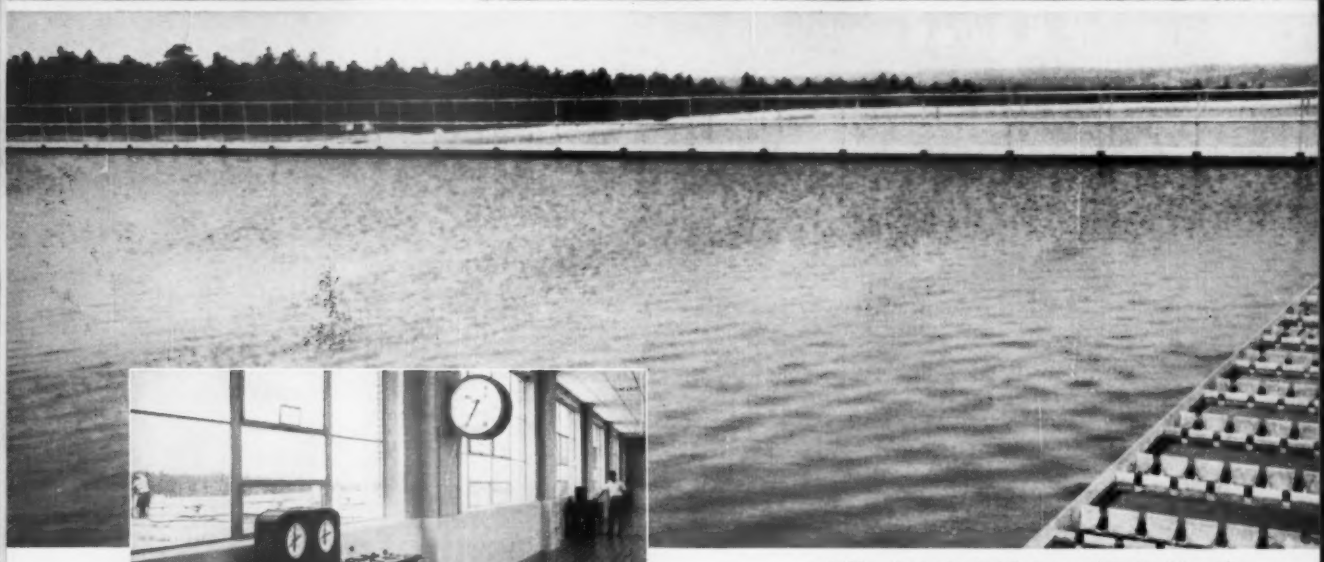
Name.....

Street.....

City.....Zone.....State.....

EXTENSION OF
WATER WORKS FILTRATION PLANT
Mobile, Alabama
JOHN A. STALCUP, Supervisor of Water Production
Consulting Engineers
J. B. CONVERSE & CO., Mobile, Alabama

A credit to its neighborhood, this modern building houses the expanded facilities which increase plant capacity from 20 MGD to 30 MGD . . . with an emergency capacity of 40 MGD.



Builders Master Control System regulates level in settling basins. Filters (not shown) are equipped with Builders Wheeler Monolithic underdrains of concrete with porcelain spheres. They're as durable as the plant itself.

Modern Builders Filter Control Tables centralize filter operations . . . save steps, conserve manpower, permit absolute control. Easy-to-read, conveniently located gauges simplify operator's job.

ONE SOURCE
ONE RESPONSIBILITY

B-I-F

B-I-F INDUSTRIES

BUILDERS-PROVIDENCE • PROPORTIONEERS • OMEGA

POSITIVE CONTROL OF MATERIALS IN MOTION BIF METERS FEEDERS CONTROLS

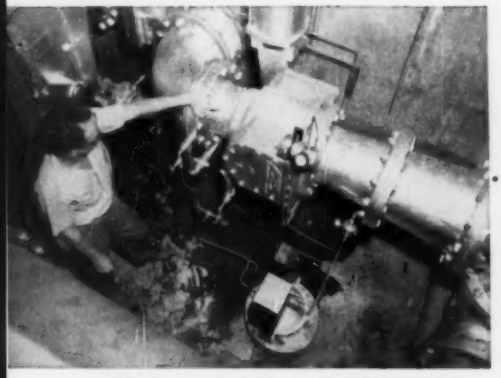
Water Treatment Plant Expanded . . . SINGLE, RESPONSIBLE SOURCE FURNISHES CONTROLS and CHEMICAL FEEDERS

Performance, quality and economy influence decision to use B-I-F products in latest plant addition in Alabama.

Mobile, one of the South's fastest growing cities, recently had to double the capacity of their Water Filtration Plant. After thoroughly exploring all aspects of such an important undertaking, Mobile decided on a reputable multi-product manufacturer of equipment already proven in the original plant.

Better coordination, through B-I-F's ability to offer a ONE SOURCE — ONE RESPONSIBILITY policy, brought immediate savings . . . during the installation and start-up stages. Fast, convenient service through local offices was another deciding factor.

If greater systems reliability and operating economies interest you, write for details . . . to **B-I-F Industries, Inc., Utilities Sales, 350 Harris Avenue, Providence 1, Rhode Island.**



Builders Pneumatic Master Control System simply and rapidly provides remote rate-of-flow setting.

Ten Builders Rate-of-Flow Controllers were furnished. Self-actuated, they conserve head, promote filter efficiency, provide long life, assure accurate flow.

Omega Chemical Feeders were selected because of their 100:1 feed range at high accuracy.

New! BADGER Read-o-Matic* REGISTER

adds speed-reading to water metering

Here is the industry's first practical outdoor register — the Badger Read-o-Matic. Now meter reading routes can be completed in half the time — with no more wasted calls. Plus other important benefits such as:

• ***No more "lockouts"*** • ***No more in-house accidents*** • ***No more access problems*** • ***No more inconvenienced customers***

The new Badger Read-o-Matic means a modern meter reading system that your water department can have now — and opens a whole new realm of possibilities for the future. You'll want to read about them in our free new Badger Read-o-Matic folder.

*Pat. applied for in U. S. A. and foreign countries

Badger Meter Mfg. Co. • 4545 W. Brown Deer Rd. • Milwaukee 18, Wis.

Equipment News

CONTINUED FROM PAGE 25A

tests may be run right on the spot regardless of availability of utilities.

Saline Water Conversion Units

113

The Maxim Silencer Co., Hartford, Conn., has available distillation units that produce fresh water with impurities of less than 4 mg/l from sea water or from other impure water supplies. These units can be constructed for producing quantities ranging from 10,000 to 10,000,000 gpd. Maintenance costs are very low as there are no moving mechanical parts.

The basket-type construction of the primary heat exchanger, in the distilling plant, employs many of the design features necessary for maximum efficiency and reduced scale formation determined necessary during the recent government sponsored Symposium on Saline Water Conversion.

These design features include: 1) High-velocity circulation of both the vapor and brine along the heat transfer surfaces, that permits better heat transfer, and reduces rigid scale formation; 2) Smooth-polished monel heat-transfer surfaces give greater resistance to sea water corrosion, allow better transfer, and have less scaling tendencies; 3) Low static head reduces the elevation in boiling point and also prevents accumulation of scale; 4) Flexing-type heating surfaces provide easy scale cleaning using the cold-shocking method; and 5) Low brine retention time to reduce scaling.

Penton-Lined Valves

114

Hills-McCanna Co., Chicago, Ill., has announced that Penton — the 300°F chemically resistant plastic manufactured by Hercules Powder Company — is now available in a lined body for Hills-McCanna Diaphragm Valves.

The new Penton-lined valves are available in cast iron or aluminum bodies. Penton-lined valves are compatible with glass, plastic, metallic and lined piping! Handwheel, quick-opening, air or electric operators are available. Size range is ½" to 6" with flanged ends only.

Edible Flocculant

115

The Burtonite Co., Nutley, N. J., has available a coagulant aid that is edible and is an "accepted" optional component of food products for human consumption by the U. S. Food & Drug Administration.

Burtonite #78 is used as a flocculant filter aid and auxiliary flotation reagent in processing such materials as potable waters, industrial waste waters, clay, borax, wood pulps, petroleum and other wastes.

Some of the benefits offered by this product include increased capacity for existing plants. Separations have been made economically that were considered impractical a few years ago. The colloid is effective in trace amounts, such as 0.00313 lbs per 1000 gals of aqueous suspension to not over 0.5 lbs per ton of ore.

Actual quantity required varies with

type and kind of water. It is a selective flocculant or settling agent in that very small dosage will flocculate clay and other easy to flocculate solids from aqueous suspension, with flocculation of next easiest solid as dosage is increased and so on.

Power Failure Closes Valve

116

Gemco Inc. of Cleveland, Ohio, has developed a heavy duty liquid valve designed for remote control operation. Opening and closing of the valve is accomplished by a built-in electric motor. A fail-safe mechanism is incorporated that immediately closes the valve should a power failure occur.

This new valve is practically maintenance-free according to the manufacturer. Design features that make this possible include: a torque-type motor arranged to operate to a stall in both open and closed positions so that no limit switches are required, a floating bronze valve ball that is hard chrome plated to resist scratching, pitting and abrasion and a resilient synthetic rubber seat that is wiped clean each time the valve is opened or closed.

Water turbulence and the resulting added friction loss are eliminated because the full round port area does not change the water stream shape as it passes through the valve. Positive seating of the ball is assured throughout the life of the valve because full stream pressure is applied against the ball whenever the valve is closed.

Air-Powered Sludge Pump

117

Thor Power Tool Co., Aurora, Ill., has developed a new air-powered sludge pump which can remove 42 gallons of sediment-filled water a minute at a 175 ft head.

The new sludge pump, Thor No. 275, has no motor and its few working parts are stainless steel and automatically lubricated. Designed for continuous two-page breathing cycle, the pump draws in sediment by air suction until its tank capacity is reached, then automatically changes cycle to close the inlet valve, open the outlet valve, and expel the contents under pressure.

Capable of entering an opening 18 by 12½ inches, the new Thor sludge pump can draw in water containing sediment up to 20 ft suction lift and deliver it up to 175 ft pumping head.

Long Distance Telemetry Systems

118

Brown Instruments Div., Minneapolis-Honeywell Regulator Co., Philadelphia, Pa., has announced the development of two types of telemetering systems for long-distance transmission and control of process data monitored at scattered locations.

One, a miniaturized system using transistors instead of vacuum tubes, measures any process variable such as temperature, pressure, liquid level, negawatts and the like that can be converted into an electrical signal and transmits the information as frequencies over any kind of communications channel to a control center.

The other, a pulse-type system, also transmits process intelligence as electrical signals, but at five- or ten-second intervals instead of instantaneously, and up to 100 miles from the source without the need for repeater relays. The time length of each pulse is the value of the process variable.

C. L. Peterson, vice president of the division, said the telemetering systems are expected to find wide application in the operation of water and sewage treatment facilities.

Here's the big news behind the industry's first practical outdoor register

The Badger Read-o-Matic is powered entirely by the meter to which it is attached . . . works on an exclusive "pulse" principle. As water flows through the meter, the generator sends a pulse by wire to the Badger Read-o-Matic register outside for accurate recording.

Like our Badger meters, the Badger Read-o-Matic is precision-engineered — thoroughly tested by our trained water meter experts in the laboratory and in the field. Badger Meter products are the result of over 50 years of *specialized* water meter experience — products that excel around the world in accuracy, durability, dependability and low maintenance cost.

Send for free, colorful brochure that tells you all about the revolutionary Badger Read-o-Matic. For an actual demonstration, see your Badger representative or write us direct.

Badger Water Meters

Badger Meter Mfg. Co. • 4545 W. Brown Deer Rd. • Milwaukee 18, Wis.

News of Suppliers

Fabian Named President of Dresser Mfg.

Dresser Mfg. division, Bradford, Pa., has announced the promotion of F. G. Fabian, Jr., to President.

Mr. Fabian joined Dresser Mfg. Division in 1953. Prior to this, he had been for three years with Booz, Allen and Hamilton, Management Consultants in Chicago. For a number of years previously, he was with The Lindsay Corporation as Vice President and Bryan Manufacturing Corporation in the Chicago area with responsibilities in the field of engineering, administration and sales.

In his capacities of Assistant to the General Manager and, since 1955, General Manager of Dresser Manufacturing Division, Mr. Fabian has worked closely with the gas, oil, water and manufacturing industries to which Dresser supplies a complete line of pipe joining and repair products.

Mr. Fabian attended Choate School and Yale University, from which he holds a B.S. degree in Industrial Engineering. He is a member of the American Society of Mechanical Engineers, Society of Automotive Engineers, and an associate member of the American Gas Association and American Water Works Association. He served with the U. S. Navy in World War II achieving the rank of Lt. Commander.

Young Named Secretary-Manager of Southern Clay Pipe Institute

Southern Clay Pipe Institute, Inc. newly organized association of vitrified clay pipe manufacturers, has announced that Lewis A. Young has been named secretary-manager.

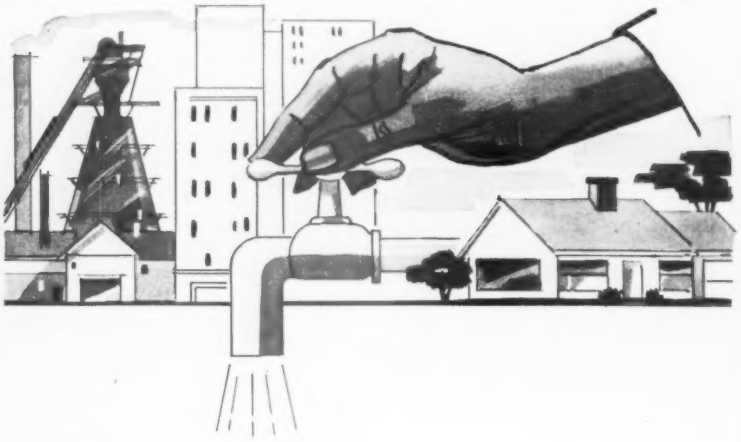
Young, a native of Neodesha, Kansas, received his B.S. degree from the University of Kansas and M.S. degree in Engineering from Harvard Graduate school. He is a member of American Society of Civil Engineers, American Public Health Association (Fellow), Federation of Sewage and Industrial Wastes Association, Inc., and Industrial Wastes Commission.

In addition to designing water and sewage treatment plants in Kansas and Missouri, Young has been chief engineer of both Kansas' and Colorado's State Department of Health. Young has seen service in Venezuela, S. A. with the Institute of Inter-American Affairs. He served in the U. S. Army during World War II and received his honorable discharge as lieutenant-colonel in the Sanitation Corps. Young recently was officer in charge of the Southeast Drainage Basins Office, Division Water Pollution Control., Atlanta, Ga.

Young currently is vice chairman of the Executive Committee of the Sanitary Engineering Division of the American Society of Civil Engineers.

Southern Clay Pipe Institute, Inc., is composed of members located

CONTINUED ON PAGE 37A

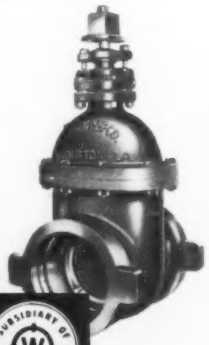


Just a TWIST of the WRIST

The three basic elements vital to your life are air, food and water. Most important of the three is water. And as civilization develops, water becomes increasingly important.

In America today, 140 gallons (60 pails) of water is required each day for every man, woman and child. It is a complex job to supply the water you need for home, industries, factories, stores, offices, schools, hospitals, fire departments and farms. To make water clear, healthful and tasteful it must first be settled, aerated, filtered and chemically purified. Millions of dollars must be invested in dams, reservoirs, pumps, filters, pipe, valves, hydrants. Design and construction of a water distribution system is a major engineering job—no two are exactly alike. Management, operation and maintenance requires knowledge of engineering, hydraulics, chemistry, business administration and "human nature."

Sometimes, when you take a shower or drink a glass of water, silently thank the water works man who makes it possible to do so night or day, winter or summer—with only "a twist of your wrist."

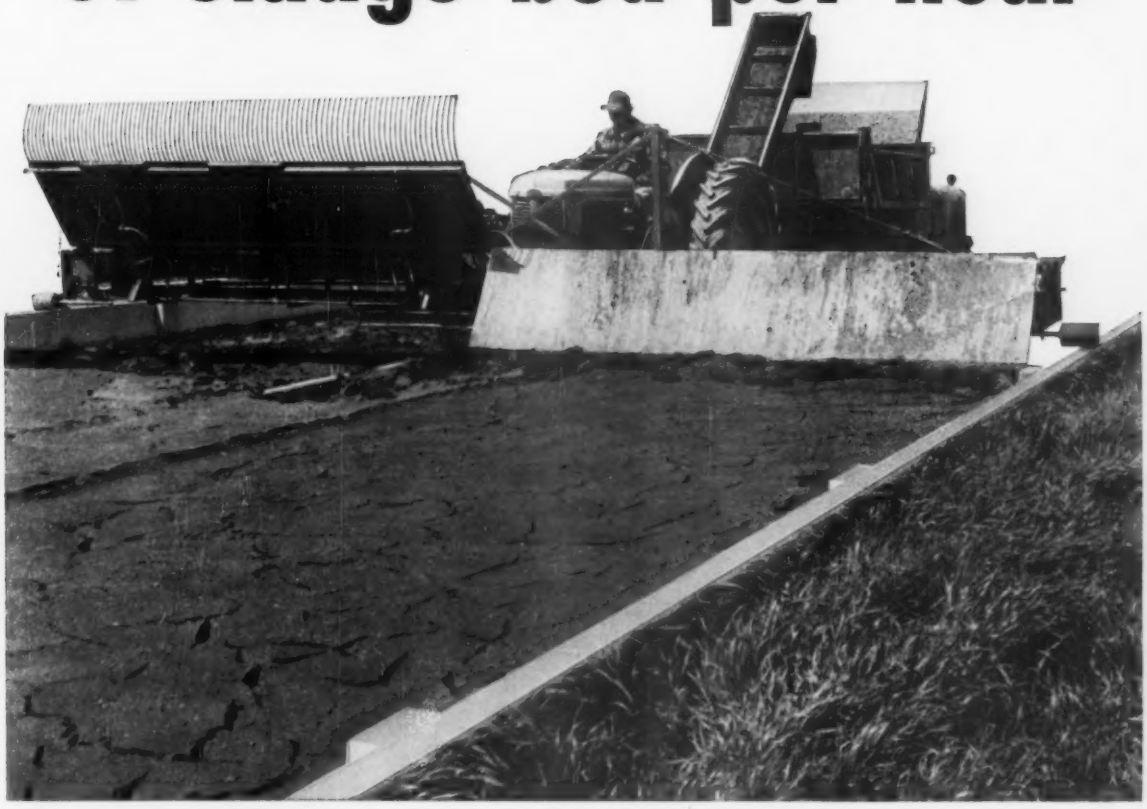


This Series is an attempt to put into words some appreciation of the water works men of the United States.

M&H VALVE AND FITTINGS COMPANY
ANNISTON, ALABAMA

SUBSIDIARY OF W WALWORTH

Cleans up to 120 feet of sludge bed per hour



Mechanical cleaner provides faster and more efficient sludge removal than conventional hand cleaning methods

Here's a mechanized method of cleaning sludge beds that will pay for itself in a relatively short time. While individual savings depend on such variables as size of plant, available manpower, method of disposal, etc., annual savings of 60% have been reported over conventional hand cleaning.

The sludge bed cleaner offered by Link-Belt is essentially a conveyor system on wheels . . . the system is mounted on a standard tractor, which travels on concrete runways in sand beds and cleans a path up to 26 feet in width. Performance-proven Link-Belt conveying and power transmission components are combined into an efficient mechanism that is operated by hydraulic motors.

The cleaning cycle works like this. Forked scoops assure minimum loss of filter bed sand. The scoops are raised alternately, elevating the sludge and chuting it over a front truss. Sludge is conveyed by two wing conveyors into a trough where it is pushed along by a center longitudinal flght conveyor. This conveyor carries the sludge up a 45° incline where it is deposited in a truck that is towed or driven behind the tractor.

For more detailed information on how you can clean sludge beds faster, more efficiently, call your nearest Link-Belt office. Send for Folder No. 2671.

LINK-BELT

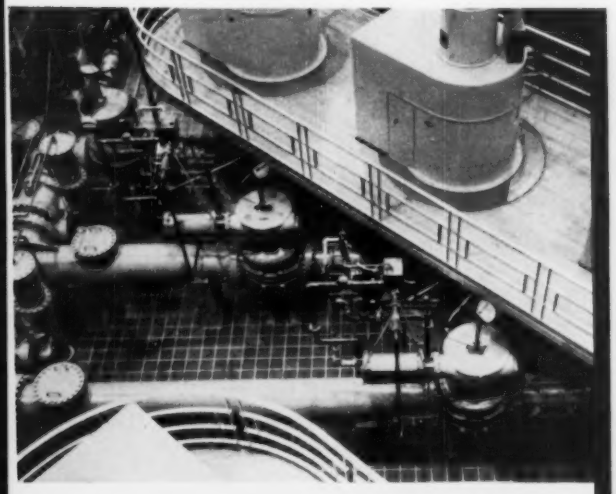
SANITARY ENGINEERING EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. Sanitary Engineering Regional Offices—Colmar, Pa., Chicago 9, Kansas City 8, Mo., San Francisco 24. Sales Offices in All Principal Cities. Export Office, New York 7. Representatives Throughout the World. 14.902

CHAPMAN

plays an important part for
an important service
to the Nation's Capital

Washington, D. C., Arlington County, Virginia and parts of Fairfax County, Virginia have unique, efficient, and progressive means of providing more effective water service for public health, convenience and fire protection. The Supply System was designed, built and is operated by the Corps of Engineers, United States Army. The Distribution System in the national capital is operated by The Commissioners, District of Columbia, Department of Sanitary Engineering. More than one million persons are being served and they are being served well... 153,157,000 gallons per day.

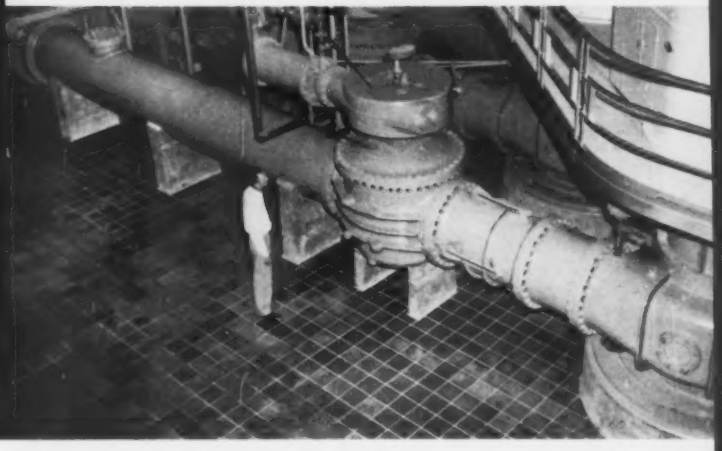


Interior views of the completely air-conditioned Dalecarlia Pumping Station showing some of the many Chapman Cone Type Valves used largely as protection from reversal on power failure of pumps and piping. The Dalecarlia Hydroelectric Station utilizes surplus water for generation of electrical energy, thereby reducing pumping power costs. The hydro-turbines may be converted to raw-water pumps, reversing the direction of water flow.

Right, Chapman 30-inch discharge cone valve, one of the countless Chapman Valves used throughout this system.

Big and modern as it is, the Water System of The District of Columbia is still expanding. They have already invested $85,323,559 in this public service and more funds have been appropriated for extra facilities. These include construction of additional filters, a new chemical building, and an added two story flocculation-sedimentation basin.

The source of water for the entire system is the Potomac River. Water is pumped through miles of conduits to the McMillan, Georgetown and Dalecarlia reservoirs for storage and subsequent filtration and treatment. Pumping stations are operated at McMillan, Dalecarlia, Bryant Street, Reno and Anacosta. Filtration plants are at McMillan and Dalecarlia. And throughout the entire system you'll find countless Chapman Valves. Chapman has been meeting the demands of this modern system for a number of years. The United States Army Corps of Engineers and the District of Columbia, Department of Sanitary Engineering insist that their valves meet every modern requirement . . . requirements that involve operation, size, pressure, stress and flow.



The **CHAPMAN** *Valve Manufacturing Co.*

INDIAN ORCHARD, MASSACHUSETTS

For more than 75 aggressive years, Chapman has been producing valves that meet every modern requirement. Chapman has the engineers, the metallurgists, the foundries, the manufacturing and testing facilities to meet the higher-pressure, higher-temperature demands of both today and tomorrow. At Chapman, there is always something new. It will pay you to talk with one of our engineers and let him bring you up to the instant. Write to us and he'll call at your convenience.

■ Cut-In Sleeve and Valve installed in main

MUELLER®
cut-in sleeves and valves

Install needed control valves without breaking pipe joints!

■ New control valves can be added and old valves replaced quickly with Mueller Cut-In Sleeves and Valves. Only a minimum of excavation is necessary. You don't have to uncover several lengths of pipe so that pipe joints may be broken. You can install the valve right where you want it — anywhere on the pipe length.

Special mechanical joints on both sleeve and valve permit one Cut-In Sleeve and Valve of a nominal size to be used on any cast iron pipe regularly found in water distribution systems by using the proper end gaskets.

Mueller Cut-In Valves have the same quality features as the Mueller AWWA Gate Valve — including the 4-point-contact wedging mechanism. "O" ring stem seals or conventional packing are optional. Indicator post type cut-in valves are also available. Sizes 4", 6", 8", 10" and 12".

See your Mueller Representative or write direct for full details.

MUELLER CO.

DECATUR, ILL.

MUELLER CO. since 1857 SERVING the Water and Gas Industries QUALITY

News of Suppliers

CONTINUED FROM PAGE 32A

throughout the south and southeast. It was created to carry on education, experimental and research programs in the fields of production, use and installation of clay products of the Clay Industry. The new association will work in close affiliation with the National Clay Pipe Manufacturers, Inc., Washington, D. C.

American Meter Buys Buffalo Meter Co.

The American Meter Co., Philadelphia, Pa., has reported that its subsidiary, Buffalo Niagara Industrial Controls Inc., has purchased the Buffalo Meter Company of Buffalo, N. Y.

W. G. Hamilton, Jr., president of American Meter, who will serve as president of the new subsidiary, said "Buffalo will be operated as a subsidiary with its own manufacturing, sales, and engineering organizations. Mr. Dante Broggi, a vice president of American Meter Company, will direct the operations of the new acquisition through Russell Wetjen, who will be Vice President and General Manager. Herbert F. Barrett will continue as Sales Manager."

Other officers of Buffalo are: A. McBeath, Treasurer, and W. B. Ashby, Secretary.

Louis Fontana Promoted

Irving Subway Grating Co., Long Island City, N. Y., has announced that Louis F. Fontana has been appointed a Vice President and the General Sales Manager.

Mr. Fontana joined the company in 1930. He was made Contract Manager in 1946 and became Sales Manager in 1948.

Mr. Fontana served as President of the National Association of Architectural Metal Manufacturers for two one-year terms, starting in 1956. He is now a member of the Board of Directors of the same organization.

In 1942 he received a Bachelor Degree in Business Administration from the College of the City of New York. He has done post-graduate work at N. Y. U. During World War II, Mr. Fontana served in the Army as a First Lieutenant.

He is a member of the American Road Builders Association, where he has recently been nominated to the Board of Directors of the Materials and Supply Division; the National Sales Executive Club; the American Public Works Association; and the Railroad Club of New York.

A ntaive of Manhattan, Mr. Fontana currently resides in Huntington, L. I.

E. F. Miller Heads Graver's Municipal Water Treatment Dept.

Graver Water Conditioning Co., New York, N. Y., has announced that E. F. Miller has been named Manager of Municipal Water Treatment Dept. Mr. Miller's department is responsible for portable water production for municipalities and industries. Mr. Miller, new to Graver, is a well known figure in the industry having over 14 years experience in the practical and theoretical phases of water treatment.

Rate Yourself as a

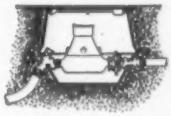
METERologist...

CHECK HERE

- ☐ Do you believe in setting water meters so that they are most available for quick and easy reading?
- ☐ Do you provide installations which put meters in the proper position and protect them from dirt and damage?
- ☐ Are your meters connected into the line so that changing can be quick and trouble-free?
- ☐ Do you test meters periodically and maintain them for maximum accuracy?

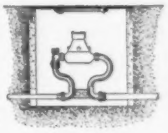
If you have checked all four you probably use Ford equipment. Don't be discouraged if your grade is off a little; the easy first step toward improving it is to send for a FORD CATALOG. IT'S FREE.

These Ford Products Make it Easy for you to be a METERologist



YOKE BOX

For shallow services the Yokebox provides protection to keep meter clean, easy to read and easy to change.

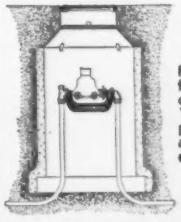


COPPERSETTER

A complete meter mounting that brings the meter up for easy reading and changing. Holds service line permanently connected.

COPPERHORN

Ideal setting for most basements with vertical service lines. Often saves more than its cost in pipe fittings.



DOUBLE LID SETTING

Provides maximum frost protection in cold climates. The Yoke holds risers permanently braced and connected for easy meter changing.

FORD

FOR BETTER WATER SERVICES

THE FORD METER BOX COMPANY, INC. Wabash, Indiana

AMERICAN METERS

HAVE WHAT THE WATER SUPERINTENDENT WANTS

ACCURACY UNSURPASSED

AMERICAN Solid Casing Meter

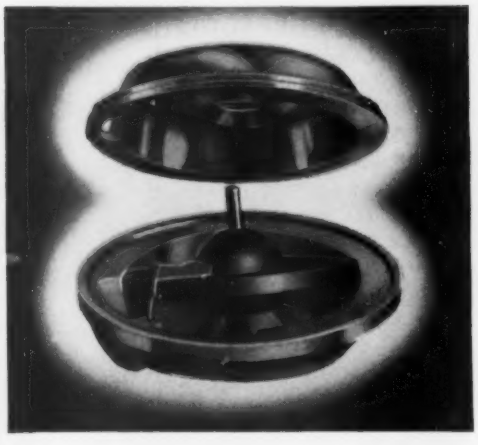
THICK DISC PRECISION MANUFACTURE

AMERICAN METERS are designed for accuracy; accuracy that resists changes caused by wear; accuracy that assures a full return for water delivered — even after many years of Service.

The reason for this accuracy record is the thicker measuring disc used exclusively in AMERICAN METERS. Increased thickness reduces slippage between disc and measuring chamber wall and the seal is maintained in any position of the disc.

Precision machining of all parts reduces friction and wear for continued measuring accuracy.

Yes, tests prove, AMERICAN METERS have the high degree of Accuracy Water Superintendents want!



The thick disc in AMERICAN METERS makes a more efficient seal against slippage than a thin disc with the same clearance.

BUFFALO METER COMPANY
INCORPORATED

2909 Main Street
Buffalo 14, New York

with hundreds of communities heard from...

CAST IRON PIPE WINS THE VOTE

Recently a questionnaire was mailed to water utility managers all over the U. S. One question asked was: *What kind of pipe do you prefer and why?* With 42 states heard from, the vote is overwhelmingly in favor of cast iron! Here are typical comments:

"1. Cast iron pipe is permanent—long life. 2. Lined pipe cuts down complaints of 'red' or 'rusty' water. 3. Mechanical joints are time and labor-saving over other types of joints, and are more flexible."

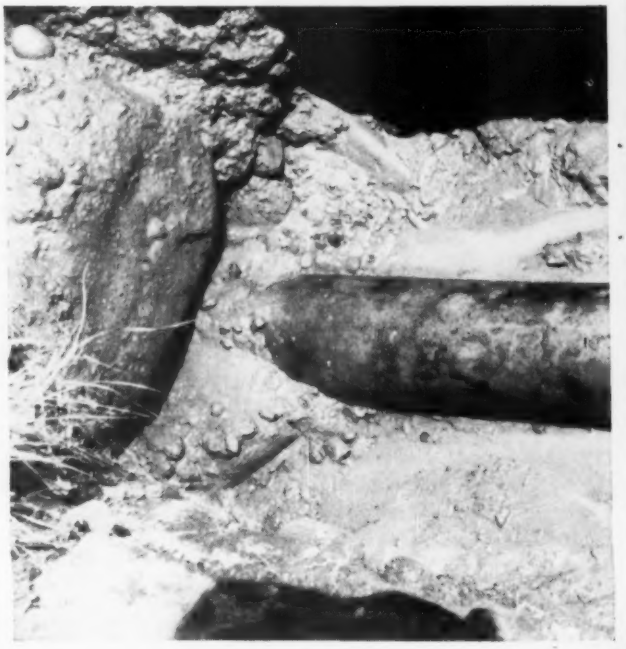
—Iowa

"Long life has been proven. I have personally observed pieces cut out of existing systems which were laid prior to the turn of the century. Such observations indicated the pipe to be as good as the day it was laid."

—Kansas

"Cast iron pipe has been in use for 200 years, and the record speaks for itself. All the other types have their use, but we would not recommend them in a well-built, expanding water works distribution system or large transmission lines."

—Illinois



HANDS DOWN!

"We are located in a limestone area. We find cast iron pipe will absorb more rock damage than any other pipe. We also use cement lined pipe to overcome our corrosion condition which exists in our water."

—Pennsylvania

"It is very easy and fast to lay, and you can swing the joint enough in places where you can save time and money."

—New Jersey

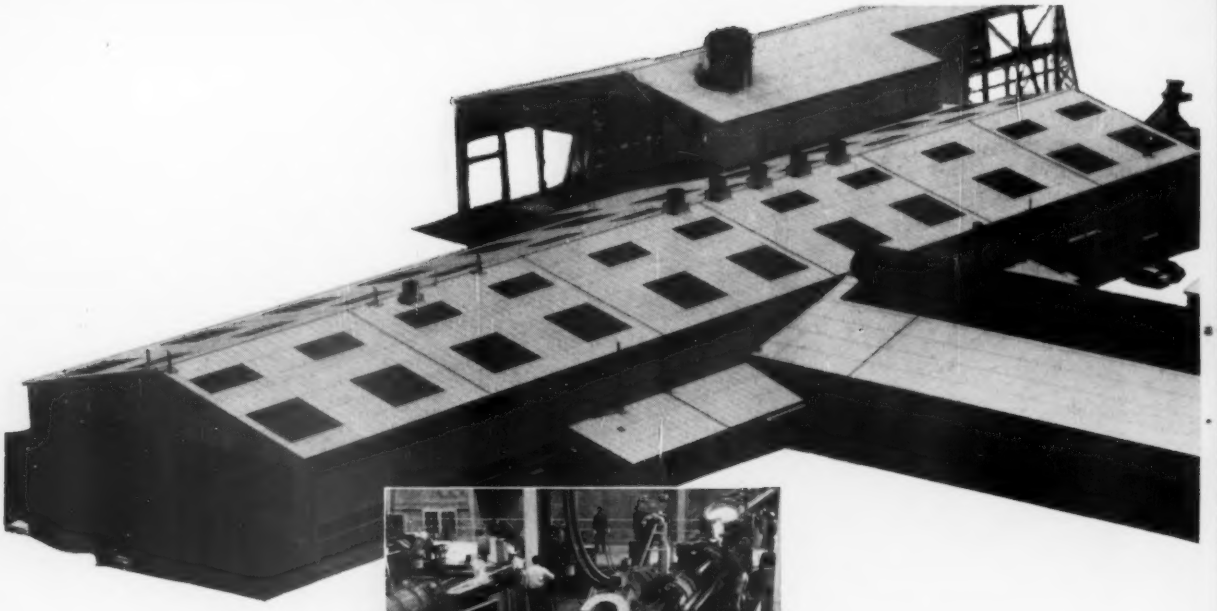
Three reasons why cast iron pipe is America's greatest water carrier:

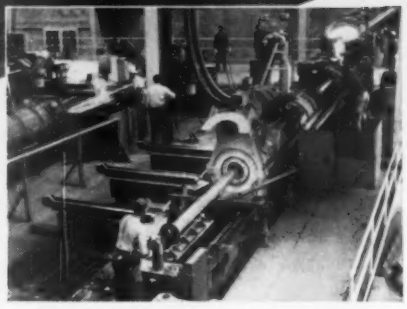
1. More miles of underground cast iron water mains are now in use than of all other kinds of pipe combined.
2. More miles of cast iron water mains are now being purchased and laid than of any other kind of pipe.
3. Impartial surveys prove that today's water utility officials and consulting engineers prefer cast iron pipe for underground water distribution by an overwhelming majority.

. . . good reasons for you to choose

CAST IRON PIPE

Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 3440 Prudential Plaza, Chicago 1, Ill.



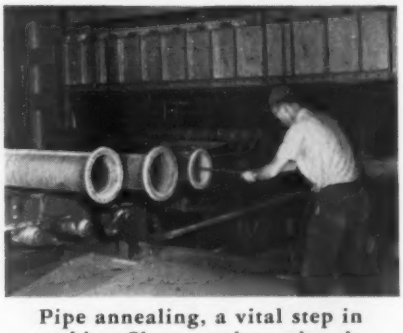


Using the metal mold process, the new casting machines at Bensenville include many patented improvements which are unique with Clow.

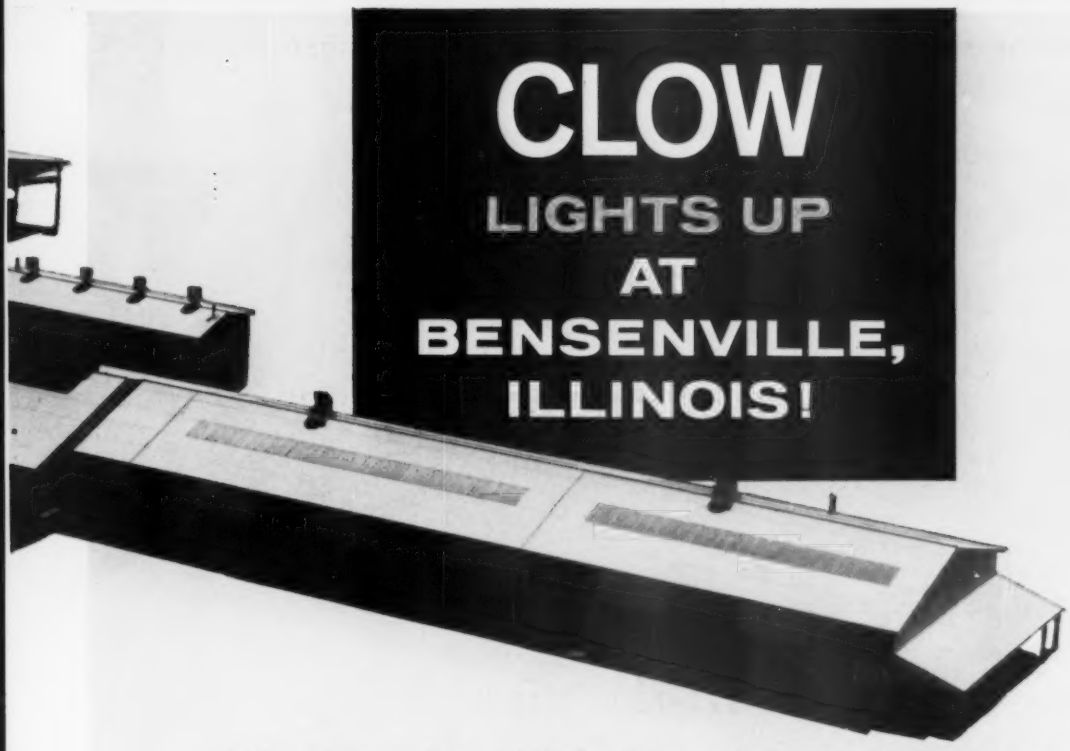
Testing is a continuous phase of the manufacturing process. All Clow pipe is subjected to a hydrostatic test of 500 lbs. per sq. inch of water pressure—2 to 4 times the normal working pressure.

CONTROL... The Key to Clow's High Quality

Clow cast iron pipe quality is assured by automatic instrument control during manufacture. In some cases, these control systems were developed exclusively for Clow.



Pipe annealing, a vital step in making Clow cast iron pipe, is carried out in this annealing oven —the most modern of its kind.



New Cast Iron Pipe Plant Begins Production to Meet Growing Midwest Market Demands

On September 22, 1958, the first pipe was poured at the new Bensenville, Illinois, Works of JAMES B. CLOW & SONS, INC., starting production at the most modern cast iron pipe plant in the world. The first plant ever constructed in the central states area for making cast iron pipe, Bensenville is located in suburban Chicago and is ideally situated to meet present and future demands for Clow pipe. By bringing producer and users hundreds of miles closer together, this new manufacturing plant will be able to deliver dependable Clow cast iron pipe *faster* for all construction needs. Bensenville is strategically located for shipment by rail, or by truck over the modern new highway network of the Chicago area. In addition, customers will benefit from new efficiencies of modern mass production in a plant located in an area central to vital raw materials for making cast iron pipe.

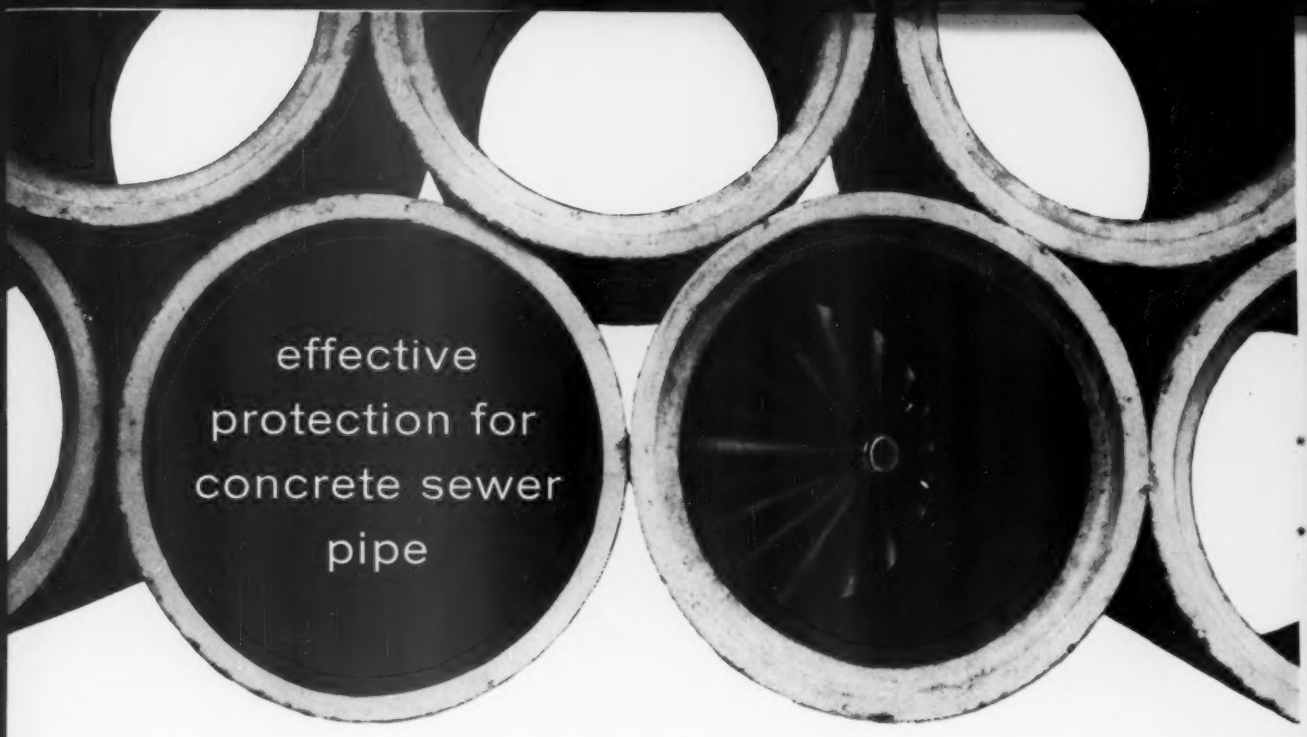
The inauguration of pipe production at Bensenville marks another step in Clow's continuing expansion program. Clow now operates pipe plants at Coshocton, Ohio, and Birmingham, Alabama, in addition to Bensenville. Bensenville is another major Clow investment in better products to better serve its customers.

OUR 80th YEAR • 1878 TO 1958

CLOW CAST IRON PIPE

JAMES B. CLOW & SONS, INC.

201-299 North Talman Avenue, Chicago 80, Illinois



Easily applied internal coatings of Copon Arocoat prevent pipe deterioration caused by sewage products

Now, you can easily prepare concrete pipe for sewage applications. For internal coatings of Copon Arocoat can be quickly, economically applied with spray equipment . . . provide positive, permanent protection against the destructive action of hydrogen sulfide and other chemicals present in sewage.

A combination of epoxy and coal tar resins, Copon Arocoat coatings have been used to solve many of industry's toughest corrosion problems. Underground, they remain tough and elastic despite temperature extremes . . . do not deterioriate. Other successful pipe applications include submerged, buried and exposed transmission lines.

Investigate use of Copon Arocoat for protection of sewer pipe and other concrete surfaces. Write today to the Copon Associate located nearest to your city.

COPON ASSOCIATES

BENNETT'S
65 W. First South St., Salt Lake City, Utah

WALTER N. BOYSEN CO.
42nd and Linden Sts., Oakland 8, Calif.
2309 E. 15th St., Los Angeles, Calif.

BRITISH AMERICA PAINT CO., LTD.
P. O. Box 70, Victoria, B. C., Canada

BROOKLYN PAINT & VARNISH CO., INC.
50 Jay Street, Brooklyn 1, N. Y.

COAST PAINT & LACQUER CO.
P. O. Box 1113, Houston 1, Texas

COAST PAINT & LACQUER De MEXICO, S. A.
Apartado Postal No. 9637, Mexico, D. F.

ENTERPRISE PAINT MANUFACTURING CO.
2841 S. Ashland Ave., Chicago 8, Ill.

SOCIETE DES VERNIS PYROLAC
51, Rue De Lechat Creteil (Seine), France

INDUSTRIAL PAINT MANUFACTURING CO.
P. O. Box 2371, Birmingham 1, Alabama

E & F KING AND COMPANY, INCORPORATED
640 Pleasant Street, Norwood, Mass.

KOHLER-McLISTER PAINT CO.
P. O. Box 546, Denver 1, Colo.

McDOUGALL-BUTLER CO., INC.
2929 Main St., Buffalo 14, New York

MULSYN PAINT & CHEMICALS
64-70 Hanover Street
Fitzroy, N. 6, Melbourne, Aust.

JAMES B. SIPE and COMPANY, INC.
P. O. Box 8010, Pittsburgh 16, Pa.

WILBUR & WILLIAMS COMPANY
130 Lincoln Street, Boston 35, Mass.

Copon®

FOR CORROSION CONTROL

SEALED FOREVER

AGAINST DIRT, WATER AND FOGGED REGISTER DIALS

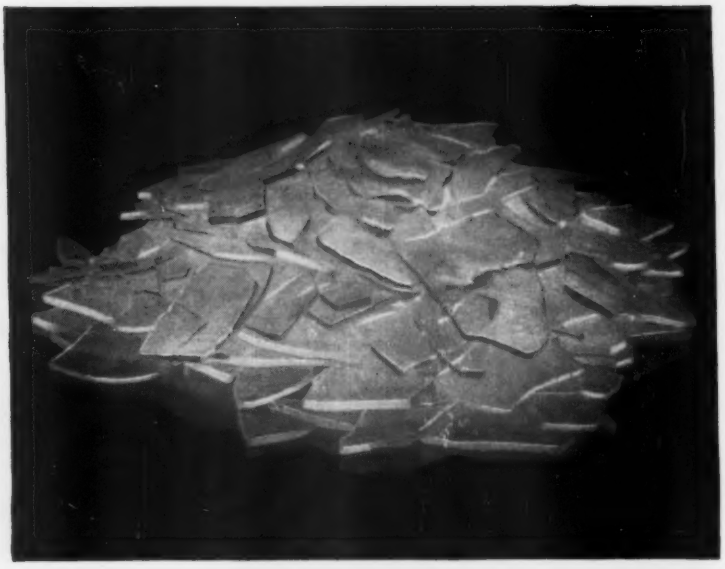
The Rockwell Sealed Register meter *alone* has all the registering mechanism and all the reduction gearing encased in a steel and glass housing. Nothing can pass this hermetically sealed barrier to cause wear or corrosion. And, since the register operates high and dry above the flowing stream, condensation under the glass just can't occur.

In this revolutionary meter, a simple, powerful magnetic drive transmits motion from the measuring chamber to the sealed register without mechanical linkage. There's no stuffing box to leak or bind—and only two moving parts operating in water. With this construction service troubles are a thing of the past, while maintenance costs go way down. Get full facts now. Write Rockwell Manufacturing Co., Pittsburgh 8, Pa.

SEALED REGISTER METERS

another fine product by

ROCKWELL



CALGON®

CONTROLS

TUBERCULATION

Tuberculation cuts down flow capacities . . . raises pumping power requirements . . . steps up costs. Calgon provides the simple, economical way to control this costly corrosion.

Calgon treatment is particularly effective after mechanical main cleaning because of its fast film-forming ability. Protection for freshly scoured metal surfaces is quickly built up and easily maintained. Calgon treatment is as inexpensive as it is effective—a few ppm control tuberculation and other corrosion problems as well.

A letter or phone call will bring you more information on how Calgon can help. Or, an experienced Calgon engineer will be glad to make detailed recommendations on your specific problem.

CALGON COMPANY
DIVISION OF **HAGAN** CHEMICALS & CONTROLS, INC.
HAGAN BUILDING, PITTSBURGH 30, PA.
In Canada: Hagan Corporation (Canada) Limited, Toronto

Water Utilities in Many Cities "DO IT NOW!"

The timely "Do It Now!" program, launched last April by the AWWA to encourage communities to correct basic deficiencies in their water systems and provide for vastly increased future water demands, is making headway fast.

Results of an AWWA survey show that many cities are now speeding up scheduled water works improvements projects, while others are blue-printing deferred plans. They are "doing it now" because they recognize that failure to provide an adequate water system can endanger public health and halt community progress.

When you "Do It Now" in your community, make sure that you don't have to dig up your water mains and "Do It Again" 10, 15 or 25 years from now.

Be sure to specify permanent

CAST IRON PIPE

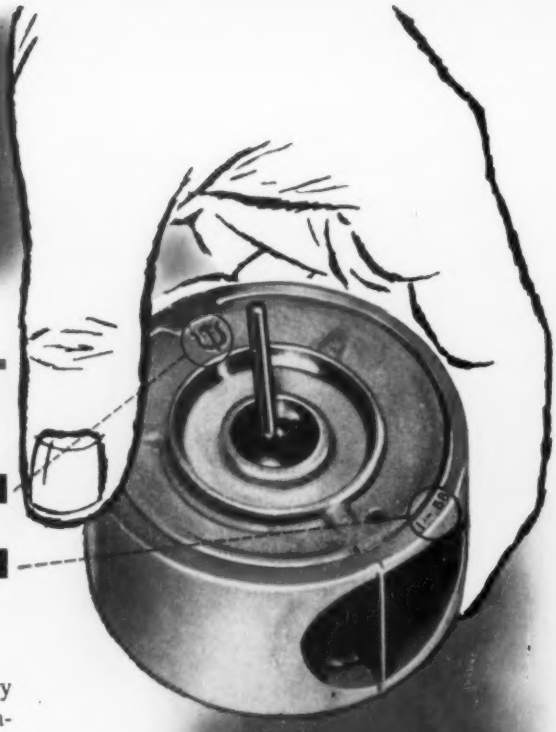
The *proved* useful life of Cast Iron Pipe is at least double the estimated life of other pipe materials used for underground mains. Its maintenance cost is far below that of any other pipe material which has been in use long enough for the recording of conclusive data. That is why Cast Iron Pipe is rightly known as "America's No. 1 Tax Saver."

Our Company does not manufacture pipe but has long supplied the nation's leading Cast Iron Pipe manufacturers with quality iron from which quality pipe is made.

WOODWARD IRON COMPANY

Since 1882

WOODWARD, ALABAMA



Every TRIDENT Unit Identified and Dated

Trident water meters are precision instruments . . . every part made to extremely close tolerances . . . every material carefully selected and tested to give longest life in *your* water system.

Most important, every improvement made in new Trident meters immediately becomes available in repair parts for your older meters. You re-order only the latest parts. As you replace worn, out-dated parts over the years, your Tridents are *automatically* modernized.

To protect you from substitutes . . . and to make sure you're getting the benefits of Neptune progress . . . the Trident trademark is put on most all Trident parts . . . and the *date* is put on every major Trident part. Take a look at these date marks. They show you how well Tridents last. They also show you how your older meters have been kept up to date over the years with improved Trident repair parts.

Insist on genuine Trident parts . . . and check to be certain.

for your protection

NEPTUNE METER COMPANY
19 West 50th Street • New York 20, N. Y.

NEPTUNE METERS, LTD.
1430 Lakeshore Rd. • Toronto 14, Ont.

Branch Offices in Principal American and Canadian Cities.

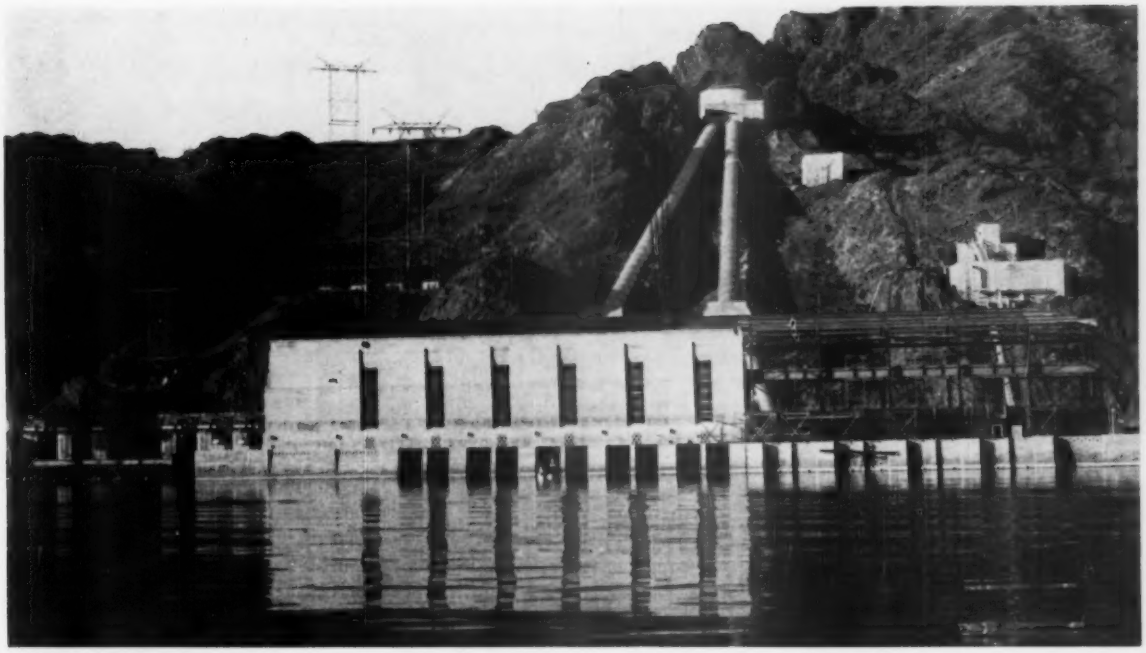
neptune
TRIDENT WATER METERS

283

Vol. 106, No. 1 · January, 1959

A Scranton Gillette Publication

WATER & SEWAGE WORKS



ENLARGEMENT of pumping plant building at intake of Metropolitan Water District of Southern California, at Lake Havasu on the Colorado River, typifies . . .

Water Supply Progress *in 1958*

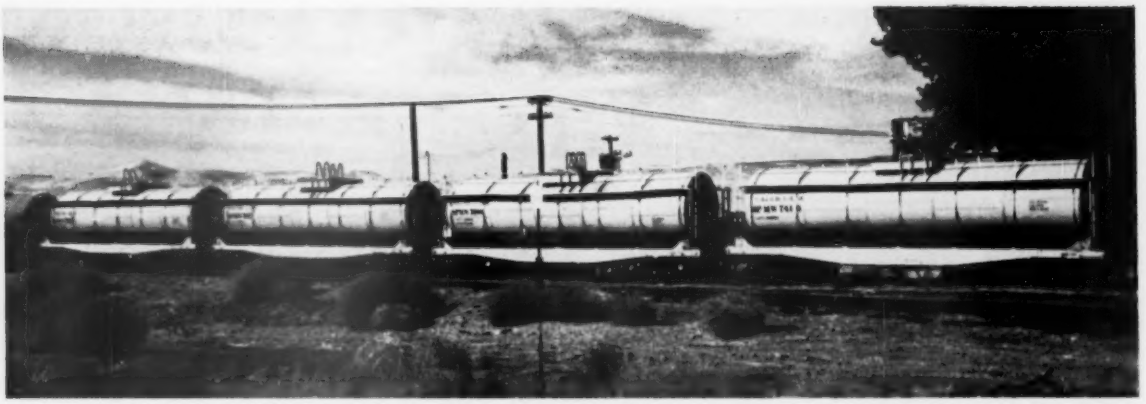
by LAUREN W. GRAYSON, Vice President
American Water Works Association

EDITOR'S NOTE: Mr. Grayson, General Manager of the Public Service Department of Glendale, Calif., has taken a discerning look at the progress in the water works field during the past year. In this review, he notes with considerable pride, the work of the American Water Works Assn., particularly its "Do It Now" campaign, and its approach to advancing the field and the men engaged in it.

Mr. Grayson is also keenly aware of the growing backlog of expansion, replacement, and maintenance needs to provide the kind of service to which customers are entitled. Past droughts, recent water excesses, and the recession were not without their effect on the water works business and the cost of obtaining money for construction likewise is an important factor in planning for the future.

Readers of this review will find Mr. Grayson's comments stimulating and will be heartened by his optimism for the future.

■ THERE ARE MANY operating water utilities in the United States—yes, approximately 18,000, serving 130 million people. In each of these 18,000 water utilities there are men, many of them, whose devotion and work when summed up create a vast reservoir of ingenuity and know-how which provide the nation's water supply



RAIL HAULING of water for Coalinga, Calif. at $7 per 1000 gal will soon be replaced by a desalted brackish well water using electrical membrane equipment at a cost of $1.14 per 1000 gal.

twenty-four hours a day three hundred and sixty-five days a year.

It is safe to say that there has been progress made during 1958 in each of the more than 18,000 water utilities. The mere reference to any specific instance of water supply improvements in this review must be multiplied many times to begin to realize the tremendous progress made in 1958. Every plant improvement could have the names of many cities, towns, and villages assigned to it and yet only a brief picture would be presented.

The water supply requirement for a single average day is big volume business. To compare product delivery with any other industry is of no particular value, although it is interesting. For example, the nation's water production for two average days, when expressed in tons, is equal to the average freight haul by the railroads of the United States for one month.

Rail hauling for a domestic water supply? Yes. In fact it has a part in the progress story for 1958. This story is not about a large utility, but it is one of importance to the people served. It is important because it is not only progress but something which will reflect a substantial saving in water costs.

Photo by Chicago Bridge & Iron Co.

ANN ARBOR, Mich. added 500,000 gal elevated storage tank; the 59 ft tank is 103 ft to the bottom.

Rail Hauling vs Saline Water Conversion

For more than 60 years, drinking water for the City of Coalinga, Calif., (population of 6300), has been hauled in by rail tank cars. The freight charge for hauling is $7 per thousand gallons. It is transferred to an elevated storage tank and served to customers through a separate metered system. The cost of water may not have been too cheap here for 60 years of the now famous quoted "75 years of too cheap water." Coalinga, located in the western portion of the San Joaquin Valley, is in an area of extremely hard water. The local well water has a total dissolved solid content of 1989 mg/L, of which 1007 mg/L is sulphates.

Over the years various methods were studied to find some means of supplying a less costly potable water supply. All were found to be more costly for one or more reasons. Early in 1958 the studies were directed to the results which might be obtained through the use of electrical membrane equipment for demineralizing brackish waters which has been installed by Ionics Incorporated, of Cambridge, Mass., in several remote areas of the world. Actual tests were conducted with a small unit at Coalinga. These tests, closely observed by officials of the California Department of Public Health and other State and local officials, indicated a way to provide a potable water supply at a greatly reduced cost.

A 1200-C Ionics demineralizer is being installed in a new plant. The cost of this installation is estimated at $85,000, and it is expected that the resulting water product will cost $1.14 per thousand gallons. The design capacity is 28,000 gallons per day; and it is estimated that the annual saving, compared to rail tank car supply, will be $40,000 based on the present average daily consumption of 18,000 gallons. This is water supply progress in 1958 for one of the 18,000 municipal water utilities and it serves only 6300 of the approximately 130 million Americans in urban and suburban areas. How many similar cases of progress could be recited if we had knowledge of them all?

Drought and Recession Effects

For a more general look at progress in the water supply field several observations may be made. Among these are the generally favorable business period and a rapid increase in water demands since the early 1950's. A prolonged drought period in much of the United States had its effect on water system demands, as did a rapidly increasing population concentrated in the urban areas. These and other causes resulted in many com-

COUNCIL BLUFFS, Iowa filter gallery is part of new facilities which increased plant capacity to 16 mgd, 4 mgd greater than present peak demand.

munities experiencing water shortages.

Perhaps there is also a fortunate side to this situation in the water works industry not unlike that found in some other public works projects. It has been said that the time to obtain an official's approval for a flood control project is while he is standing knee deep in the mud during a flood. A considerable amount of plant expansion started during those years of the early 1950's has been completed during the year 1958. New and more costly plants put into service, coupled with continued inflation, have necessarily meant higher water rates.

The heralding of the year 1958 saw many people concerned with the recession. There had also been a considerable increase in rainfall in many parts of the nation. In adding some of these reflections together for a 1958 picture we see reduced consumption and revenue to the point of a discouraging postponement of vitally needed improvements. The water works industry's construction program for 1958 is estimated to be $400,000,000, which is approximately 12 per cent below that of 1957.

A look at some of the water supply projects completed in 1958 would indicate an improvement of the margin between supply capacity and demand.

For example—Grand Forks, N. D., with water rationing every summer since 1954, has held the peak demand to the maximum plant capacity of 4.0 mgd. This year a plant expansion project increasing its capacity to 8.0 mgd was placed in operation. No rationing was necessary in the summer of 1958 but the peak demand did not reach 4.0 mgd.

In Kansas City, Mo., plant capacity has been increased to the level of 210 mgd. The maximum day demand has been 154 mgd. (Picture #4). With an increased plant capacity to 16 mgd the peak demand reached at Council Bluffs, Iowa, is 12 mgd. Omaha, Neb., with increased treatment plant and pumping system capacity to 140 mgd, has had a peak system demand of 110 mgd.

With improved concepts of design increased capacity in treatment plants has been accomplished. Omaha, said to be using the world's largest installation of "solid contact" basins, through this use increased the capacity without added space. Kansas City, Mo., plant capacity was doubled with an increase in physical size of only 50 per cent.

"Do It Now" Program

Sputnik-I offered a challenge which has had far-reaching effect on the nation's economy. Is there not a parallel in the "Do It Now" program of the American Water Works Association which was fired off as the theme of the Dallas conference last April? While many would disagree with any answer to this question, we cannot avoid facing some facts.

The backlog of proposed water works construction in the United States had increased by July to a total of $2,658,000,000. The increase for the first six months of 1958 was approximately double that for the year of 1957 which saw an increase of approximately 8 per cent.

Construction cost indexes for various water utility facilities for the past year reflect a 1958 cost nearly double that for 1948. Most economists express their views for a continuation of a somewhat similar pattern for the next 10 to 20 years. Yes, the "Do It Now" program thinking should have a far-reaching effect on the economics of the nation's water supply.

Photo by Omega Machine Co.

INDUSTRIAL water supply is important too, and for the US. Steel Fairless Works, alum and hydrated lime are used in the treatment processes, dosage being proportioned according to flow of water.

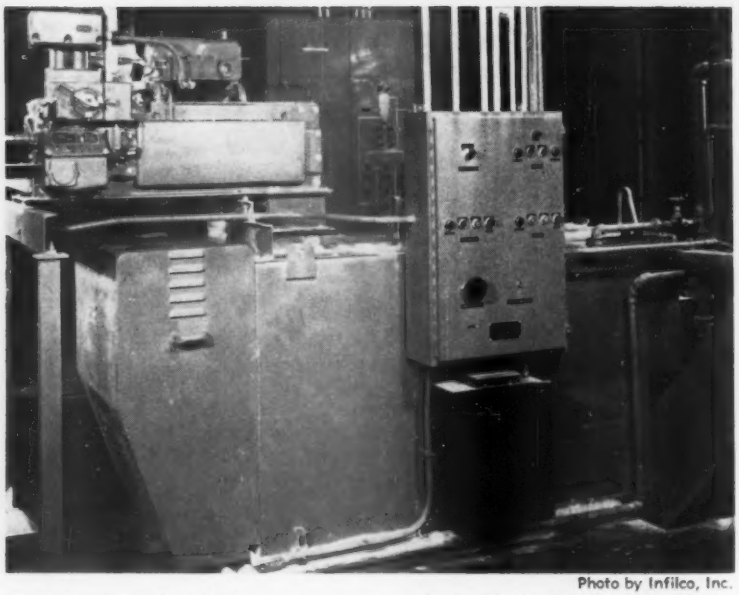


Photo by Infilco, Inc.

ST. PAUL, Minn. installed a cold water lime slaker which slakes as a paste.

A midyear survey of nearly 200 water utilities, serving approximately 15 per cent of the water customers in the United States, indicated that more than half were speeding up on projects scheduled for later in the year. Nearly one-quarter of the utilities contacted were advancing the date on projects scheduled for 1959.

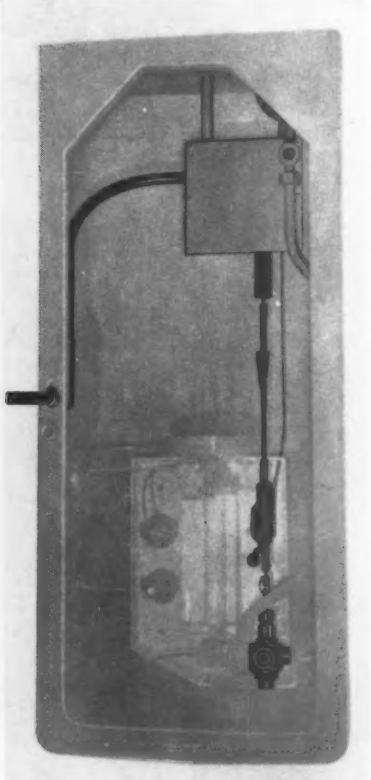


Photo by Wallace & Tiernan, Inc.

NEW EQUIPMENT introduced during the year included an electrical plug positioner for electrical control system of chlorine feeder.

The estimated cost of the projects involved in the indicated speed-up was $59,000,000; not an impressive figure when related to the midyear water works construction backlog estimate. It does, however, represent approximately 15 per cent of the then estimated 1958 water works construction expenditures of $400,000,000.

Southern California

The continued construction program of the Metropolitan Water District of Southern California with its nearly 250 miles of aqueduct and over 700 miles of feeder systems, repeatedly marks water supply progress. It is a "Do It Now" program to the extent of over $40,000,000 per year. Bringing water from the Colorado River to the south coastal plain of Southern California is no small task in itself, but stepping up by 15 years the anticipated construction for the maximum delivery of 1800 cfs has offered a real challenge.

Dependable supplemental water supply to 83 cities and several municipal water districts means heavy construction, of which a substantial part is in highly developed areas. The common sizes of pipe being placed in the feeder systems during the year were 72-inch, 75-inch, 78-inch, and 97-inch inside diameter.

During 1958, the second barrel of 47 of the main aqueduct syphons was completed. An aggregate length of 12.1 miles of 13 and 13.5 foot diameter precast reinforced concrete pipe was laid, leaving on the drawing board 7.2 miles. A pipe plant set up in the desert, moved once during the year, was the scene for the casting of the 3757 pipe sections used. From the plant the pipe sections, which weighed up to 68 tons each, were transported to job site storage areas by special heavy-duty truck trailer units over specially constructed roads. From the job site storage areas the pipe sections were placed in the trench using a machine called a "pipemobile," a machine designed to enter the pipe, pick it up, move it into position, and seat the pipe joint. To permit the machine to enter and leave the pipe without damage to the steel joint rings it has two sets of front wheels arranged in tandem. With controls arranged to shift the load from one set of front wheels to the other by means of vertical hydraulic pistons the machine enters and leaves the pipe freely. The pipe sections are lifted by means of hydraulic pistons located in the central body of the machine.

Six years of construction work on this system has seen the expenditure of nearly $117,000,000, with $40,000,000 last year and a projected $45,000,000 expenditure for next year.

Reference has already been made to the construction cost index which has continued to increase in 1958. In a minor way some of the components, particularly in heavy construction, have held nearly level in costs to that of last year.

Cost of Money

The second important part of financing a water system, the cost of money, is reflected in the municipal bond market. After a down trend in interest rates during 1954 and 1955 the following upward trend continued for a high year in 1957. The year 1958 saw a considerable drop in interest rates, particularly on short term bonds. Some indications were had that short term bonds would pay only about one-half the interest rate of long term securities. Some securities reaching the market, even though long term, at an opportune time were sold

METROPOLITAN Water District of Southern California was busy installing new 72-inch diameter precast concrete pipe in the La Verne to Garvey portion of the middle feeder line; Buckeye trenching machine was used on this job.

with average interest cost as low as the market reflected in 1951 and 1952, which was approximately 2.25 per cent. This would reflect a cost of money approximately 35 per cent less than the average for 1957.

The importance of this advantage in the lower cost of money can be illustrated by considering a hypothetical new system built in 1958 with 1957 bond money. Assuming a cost of $250 per person to provide the facilities, the cost of money based upon the 1957 average interest on municipal bonds would require a water rate high enough to include 18c per 1000 gallons for interest alone. The reference above to a 2.25 per cent average interest cost in 1958 would reduce the rate burden for cost of money by 6.3c per 1000 gallons.

While not encouraging from a rate standpoint, some few examples of this very high cost of money exist. Dry years and water rationing followed now with wet years and reduced sales has caused interest charges to make deep inroads on the annual revenues.

A partial solution to the high cost of construction and money which continues to receive acceptance is the metropolitan water supply agency or water district. By this method a larger service area produces lower unit costs in the required larger facilities. Generally a better money market is available; thus, the financing of the system is lowered.

AWWA Progress

Reference has been made to the "Do It Now" program of the American Water Works Association and the potential value it has for the furtherance of better water supply. Several other activities of the Association are worthy of recital in the study of progress made during 1958.

The water works advancement program formulated this year, aimed at water works people throughout the country for over-all improvement, has as its objective, development of the best possible water utility service for the entire industry. This program when fully developed should prove to be most valuable to thousands of water works operators. It should provide them with many useful tools to

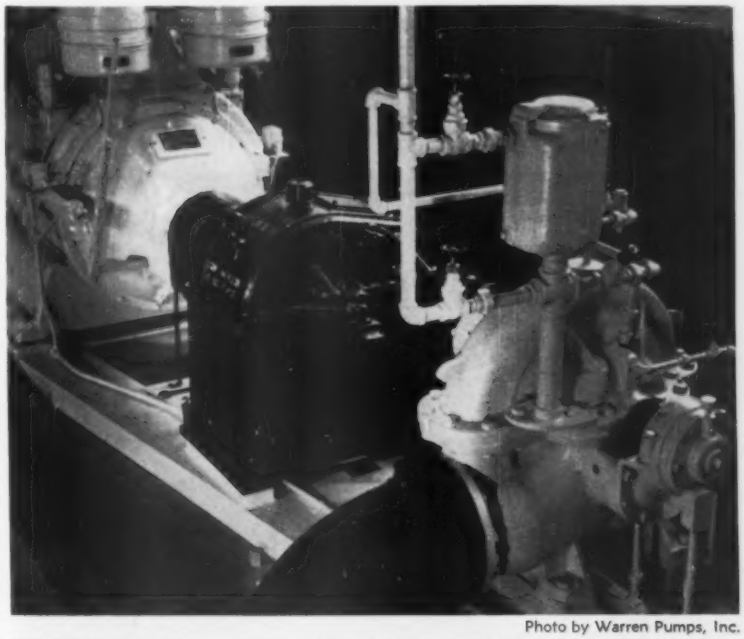
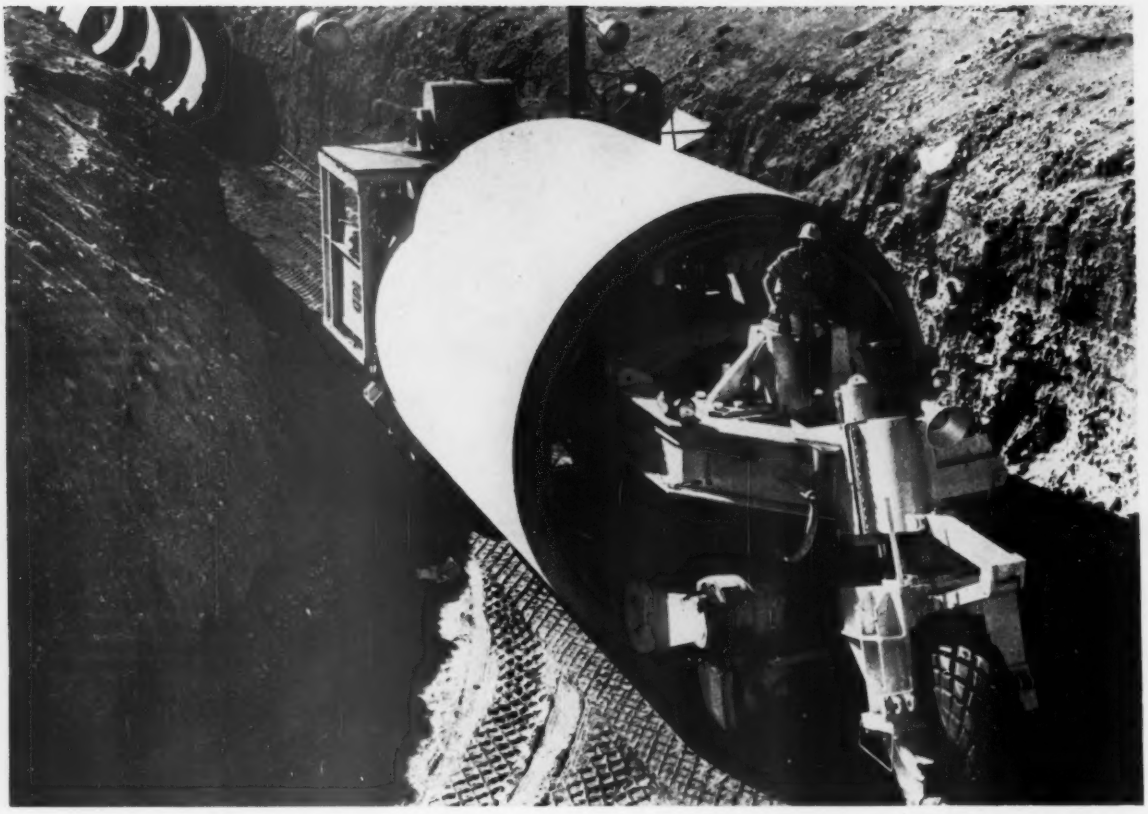


Photo by Warren Pumps, Inc.

PUMPING capacities at many plants were in need of expanded capacity. This unit is driven by internal combustion engine through a Philadelphia reduction gear.



"PIPEMOBILE" at work placing 13 ft 6-in. diameter precast concrete pipe in second barrel of main aqueduct on Big Morongo Canyon siphon of Metr. Water Dist. of So. Calif.

aid them in their system improvements. The hearty response that has been evidenced by water works people in numerous association section meetings speaks well for this important step in 1958.

Two important mileposts have been set by the American Water Works Association in the field of industrial safety. The first came in 1955 with the publishing of a safety manual for water works. This was developed after a study of five years and stemmed from an unusually high accident frequency in the water works industry. The second and more recent was the close of the first year of an incentive safety program with the issuance of safety awards. This first year has seen more than 400 earned safety awards presented. These awards, for Progress, Merit, and Honor in the field of improved safety in water works, were made by the various Sections of the Association.

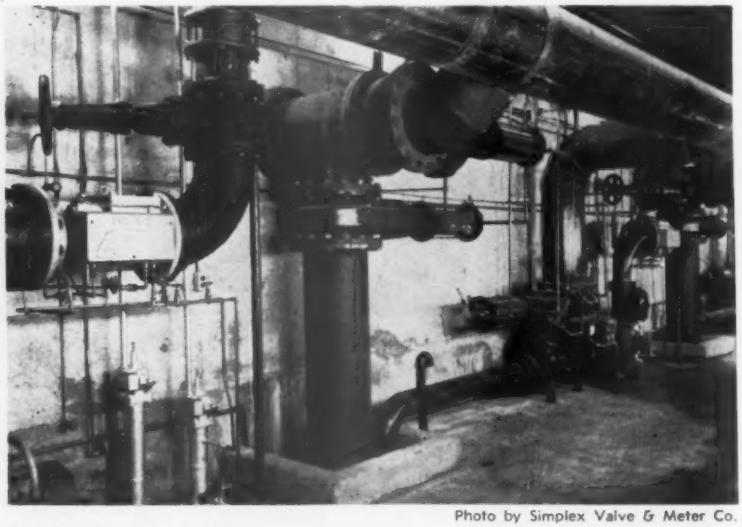


Photo by Simplex Valve & Meter Co.

FAIRMONT, Minn. installed a new type of controller in its filter gallery.

At the Association level there is provision for three awards to be given annually. The Wendell R. La Due Safety Award is in recognition of Mr. La Due's founding of the American Water Works Association's safety program. Two were presented in April of 1958 at the Annual Conference in Dallas. An award is given for each of three class sizes of utilities, one with fewer than ten employees, another with ten to one hundred employees, and a third for those utilities employing more than one hundred people.

The saving to be had as a return on a well-practiced safety program is recorded in the writing of the indus-

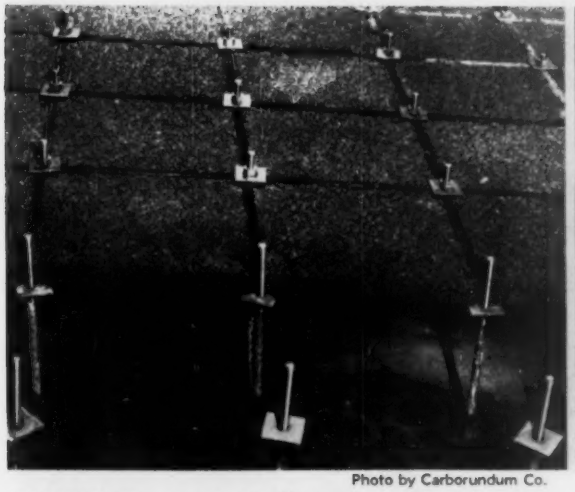


Photo by Carborundum Co.

KENOSHA, Wis. replaced its filter underdrains with porous filter bottom using the long bolt method of support and anchorage.

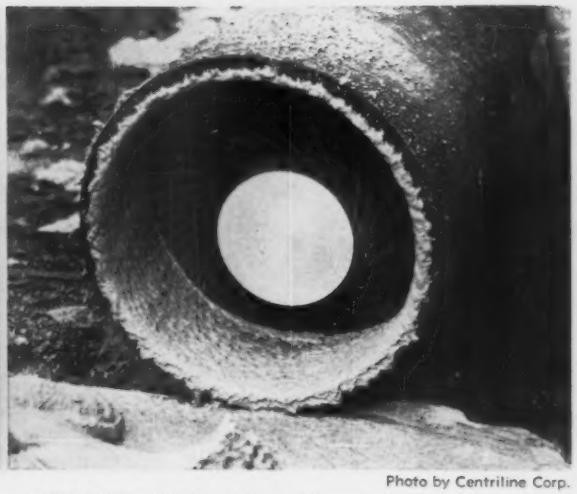


Photo by Centriline Corp.

NEW PIPE LINING equipment became available for lining pipes from 4 to 16 inches in diameter, without the necessity of having to excavate at valves, etc.

try and time can be fruitfully employed in its reading.

The year 1958 has seen much being done toward a water works material certification program by the American Water Works Association. There is hope. It may be dim, but the year has marked the start. If new ways evolved from the keen minds of water works people were not incorporated into so many material supply needs, then certification would be greatly simplified. The objective of the certification program, first approved for gate valves in sizes up to 12-inch, is to provide a means available to the commodity manufacturer to certify products as meeting certain approved standards; thus, a purchaser would be informed of a standard specification commodity. Divergent views are had on this program; however, in spite of these it has considerable potential value.

Fluoridation has seemingly become recognized as a part of water treatment. The list of communities with fluoridated water supply continues to grow. The midyear estimate indicated that 33.5 million people in the United States were being served water from plants where fluorides were being added.

Shall we write about the future as seen from 1958? Or shall we be satisfied to say that the anticipated 60 to 70 million population increase during the next 15 to 20 years has produced many plans and changes in plans for water supply systems? It has, during the past year, been brought to a sharper focus at all levels of government. Some concern has been expressed at the resulting implied Federal interest in matters related to water supplies, believed by some to be of no higher than state concern.

The most important point is that the water supply systems will need to be constructed for a population of 150 per cent of the 1958 requirements by 1975. This will mean a lot of doing, and if no other progress were made in 1958 the increased recognition of this alone with the doing of something about it would be real progress.

The writer expresses his appreciation for the assistance offered him by many people in the water works field. It would have been a pleasure to report on the water works improvements made by any of the 18,000 utilities, or all of them, were it possible. Time would not permit further investigation of the many developments. We of the water works industry can rightfully be proud of the accomplishments in our field and for the many fine people responsible. We face the future with confidence in the knowledge that our industry will meet the challenge.

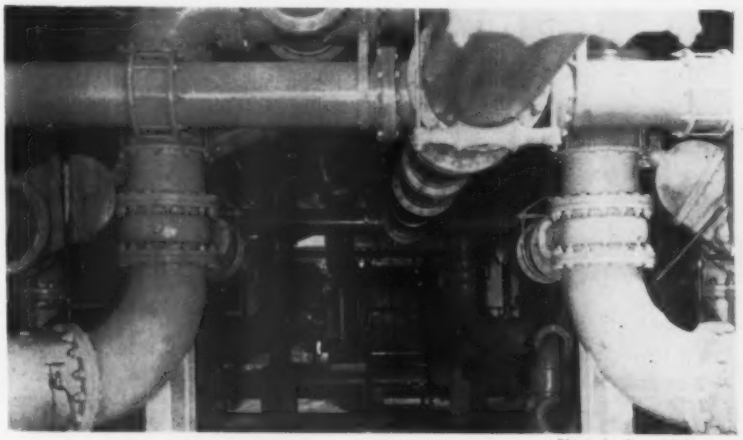


Photo by Inertol Co., Inc.

WINCHESTER, Va. built a 7 mgd water treatment plant to meet rapidly expanding industrial and residential needs of the city and suburban areas. Dresser couplings and protective paints were used on pipe lines in filter gallery.

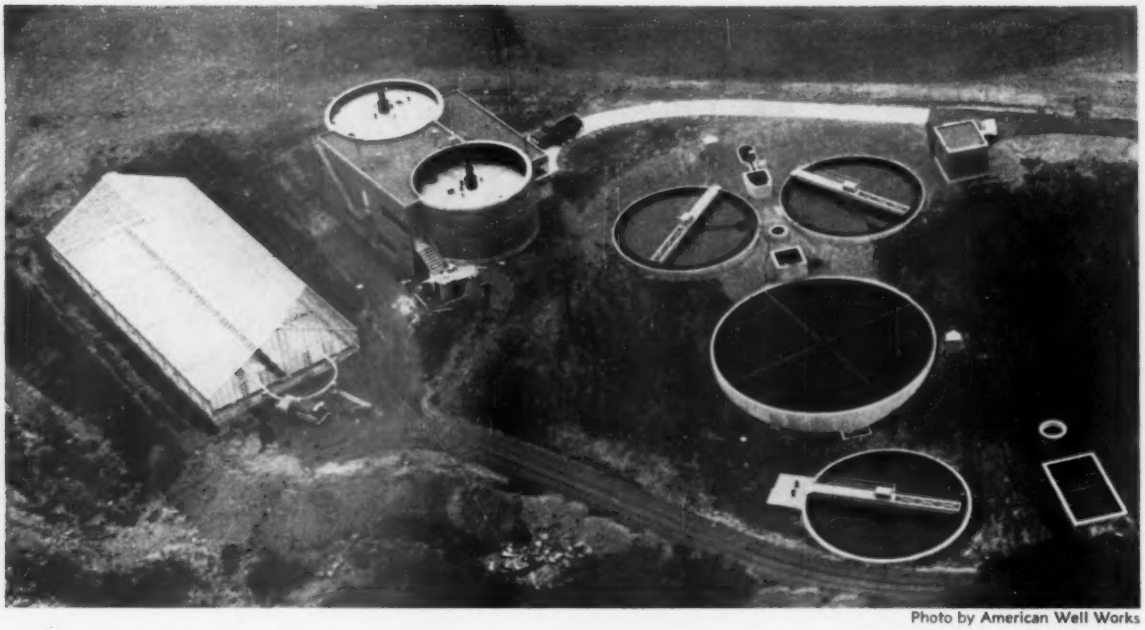


Photo by American Well Works

THE MT. JOY, Penna. complete sewage treatment plant with a capacity of 0.5 mgd for 4400 persons is reason for this community to be proud of its part in . . .

Wastewater Technology Progress *in 1958*

by WM. D. HATFIELD, Ph.D., President,
Federation of Sewage and Industrial
Wastes Associations

EDITOR'S NOTE: Dr. Hatfield retired last January 31, after 35 years as Superintendent of the Decatur (Ill.) Sanitary District and has been devoting his efforts to Consulting and to serving the Federation as vice president and now as president.

In this review of the past year's activities, he has limited himself to the broader aspects of the subject and, for the most part, has not included any information on construction and research since both of these topics have been covered in other review articles in this issue.

Dr. Hatfield has emphasized the importance of the Federation in the overall progress in the field of wastewater disposal and treatment. He has acknowledged the contribution by Dr. R. E. Fuhrman, Exec. Secy. of the Federation for some of the information on the activities of that organization.

■ EXPANSION of municipal waste treatment facilities exceeded expectations for 1958. Only a year ago, with a recession uppermost in many minds, it was predicted that the construction of sewage works in 1958 would be off 7 per cent from 1957, which had shown a gain of 12 per cent over 1956. By November of 1958, however, new construction during 1958 was estimated at $840 million or an increase of 8 per cent over 1957. By year's end the indications for 1959 were for an estimated 13 per cent increase over 1958.

The extent to which grants under P.L. 660 affected this gain is not to be discounted as has been pointed out by Simpson and Merz in this issue. Records for the first year of operation of P.L. 660 grants (to July '57)

show 446 projects receiving grant aid. During the second year of operation (to July '58), the number of projects receiving grant aid was 592.

From small plants to large, new facilities were the keynote to progress in this expanding field of endeavor and yet, McCallum and Thoman speaking at the Federation meeting in Detroit reported that "(a) nearly half of the 96 million people in the United States don't have adequate treatment facilities (some have none at all), (b) a third of the existing sewage treatment plants are not adequate for the 28.8 million people they serve and (c) one plant in every seven should be replaced." A Statistical Summary of Sewage Works in the United States (U.S. PHS Publ. 609) by Thoman and Jenkins served as source material for these observations that in spite of our progress, we are losing ground in our battle against pollution.

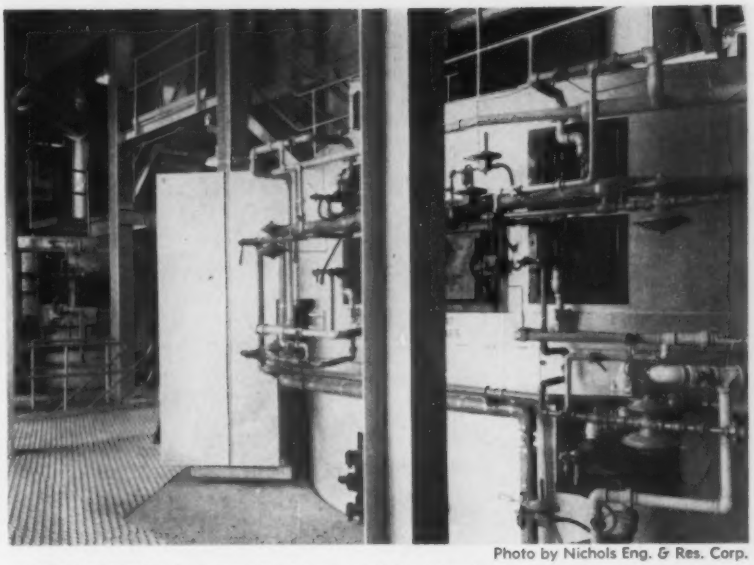


Photo by Nichols Eng. & Res. Corp.

INDIANAPOLIS, Ind. installed four multiple hearth sludge dryer-incinerators.

Interstate Basins

Progress in pollution abatement was reported for both the Ohio River Valley Water Sanitation Commission and the New England Interstate Water Pollution Control Commission. At the beginning of 1958, in the Ohio River Valley, municipal sewage treatment facilities to serve 86 out of every 100 persons were in operation or were being completed. Pollution abatement on the 19 major tributaries to the Ohio River was equally substantial. In addition, 717 out of 1431 industrial plants were providing adequate control of waste discharge. Progress during the year has been continued.

In the New England area, after ten years of cooperative effort, results had been effected to the extent that 84 per cent of the population is now served by treatment plants, a significant gain which is being extended.

Some New Ideas

Several new concepts of sewage treatment and new ideas for equipment and processes were given impetus though publicity or articles published during the year. These ideas ran the gamut from the sewer system to stream pollution.

With respect to the sewer system, the use of equipment to photograph the interior of sewers offers a means of knowing the exact location and status of breaks or failures as well as the overall condition of the interior of the pipe. Such information is highly advantageous to preventive maintenance programs.

A highlighted and growing problems is that of treating sewage from service areas on our ever lengthening system of turnpikes and super-highways. Important to the solution of this problem is a knowledge of the load to be expected, the selection of proper treatment processes, the employment of such designs as covered trickling filters and pre-digestion of sewage sludge.

A new design for sedimentation tanks, termed the Uniflow tank, was offered as a means of improving the removal of settleable solids. The handling of grit by closed tubular conveyor systems appears to have proved itself.

With respect to improving the sludge digestion process, investigators reported on the application of high rate digestion, the use of gas diffusion to increase digestion rates, and the calculation of digester net effective capacity as a key to digester loading.

Within the treatment plant itself, the matter of sludge handling and disposal still attracts interest. For mechanical dewatering, that interest centered on the use of various vacuum filter media, including synthetic fiber cloths, woven metal fabric, and coil spring filters.

A new idea was introduced for the final disposal of sludge by "wet combustion." Two processes were reported. One, the "atomized suspension technique" sprays sludge under 40 psi into a reaction tower and allows the sludge to fall as fine droplets through a rising column of 1400°F air. The other, the Zimmerman Process, employs a stainless steel reaction chamber through which the sludge is forced accompanied by a constant air supply. The major part of the system is under a pressure of 2000 psi. Combustion takes place in the reactor at 500°F. Both processes produce a finely divided powder ash and excess steam as a byproduct.

The effect of algae on D.O. and B.O.D. of streams and impounded waters was reported in considerable detail. Whereas previous concepts have been that algae growths furnish a source of dissolved oxygen to polluted waters, it now appears that "this is not a free gift obtained at no cost"; the death of algae can produce a B.O.D. which will cause a depletion of D.O. even greater than that originally supplied by the algae. It appears that "water resource problems accompanying intense algae production will grow throughout the country as levels of available algal nutrients (from sewage effluents) increase and many water areas become improved algal habitants as a result of impoundment."

Some Old Problems

Providing safe, satisfactory and economical sewer service to metropolitan areas remains an important

Photo by Komline-Sanderson Co.

TRENTON, Mo. with a trickling filter plant designed for 9000 persons, dewaters fresh solids at a rate of 595 pounds of dry sludge per hour, producing a filter cake of approximately 70 per cent moisture.

challenge, that requires the best application of sound principles of area planning, legislation, regulation and operation.

The exact effects of synthetic detergents and the extent thereof, still remains in the controversial stage, but the impact of syndets on sewage characteristics and possibly treatment methods cannot be denied. For the first time in the history of sewage treatment, a common household material has actually effected a change in the composition and character of sewage.

How to prevent colloid formation in sewage and how to increase the removal of colloids once formed can only be solved by further basic research such as was reported in WATER & SEWAGE WORKS in Oct. 1958.

Considerable interest is still evidenced in regard to the use of sewage sludge as soil conditioner, although the actual consumption of this material for that purpose has grown slowly. Problems of packaging and distributing the material are still the basic obstacles to the widespread use of sludge for this purpose.

In the laboratory, interest continues in the improvement of analytical methods particularly in instrumental methods. Reports on the membrane filter for the determination of bacteria indicate that this method has a big future. Work continues on improving the application of the technique. Progress on revising Standard Methods was reported.

Industrial Wastes

In the area of cooperation between industry and municipalities, the most outstanding example was that of the American Cyanamid Co. Its new $4.5 million plant at Bound Brook, N. J. accepts and treats the waste from several small communities nearby.

Control of stream pollution by robot monitoring was suggested by E. J. Cleary of ORSANCO. A system for the control of chloride discharges to the Ohio River was established by ORSANCO.

The cooling water project at Buffalo, N. Y. as a means of reducing the pollution problem of five industries located on the Buffalo River was stymied once more by legal problems after it appeared ready to be put into being. This scheme, originally proposed by Dr. George E. Symons, in 1946 as Consultant to the Buffalo Sewer Authority, has approached reality several times in the intervening years, but each time has been held up by legal problems.

Atomic energy wastes continued to attract attention and several articles appeared on how to handle such wastes. Toxic wastes received their share of attention with particular reference to the use of bioassays to determine toxicity and the effects of such waste on fish of all kinds.

In-plant treatment or pre-treatment of waste offers a means of reducing the load, not only on streams, but also on municipal sewage treatment plants. Among the many wastes studied and reported on were those from tanneries, food processing plants, antibiotics, meat packing, phenols, pulp and paper, and many others.

In addition to the programming of industrial wastes papers on many of the Federation Member Association programs, there were several meetings devoted principally to industrial waste

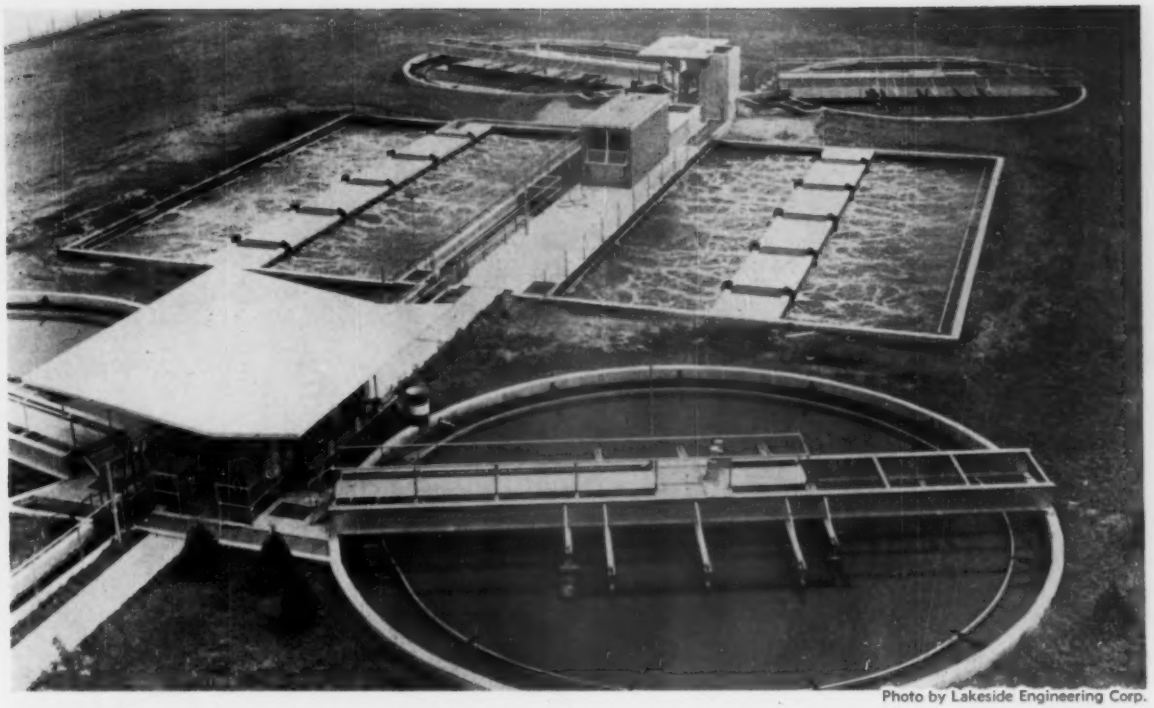


Photo by Lakeside Engineering Corp.

PIQUA, Ohio, put into operation a 4 mgd plant for complete treatment utilizing primary clarifiers, activated sludge and final clarifiers.

treatment problems. Notable among these were the Purdue Industrial Waste Conference, the Ontario Industiral Waste Conference, the Southern Municipal and Industrial Waste Conference, as well as one day meetings in New York, Illinois, Georgia, New Jersey, and elsewhere. At some of these industrial meetings, a trend was noted to include air pollution problems in the program since this is an important problem to many industries.

From the foregoing comments, the many challenges of the wastewater (sewage and industrial wastes) field are readily apparent. The technical challenges alone are so absorbing that many engineers and research workers are busily engaged pursuing new truths and new interpretations of old truths in laboratories, pilot plants and in plant operation.

Federation Progress

There are other challenges which may be approached through the organization in the field, the Federation of Sewage and Industrial Wastes Associations. Recent months have been most important to the formative and productive endeavors of this organization and new activities should be of a benefit to all engaged in wastewater works.

While the Federation's meeting at Detroit was filled with a technical program to appeal to registrants, technical committees and the Federation Board of Control were busy with the making and planning of progress on the organization front. Committee reports showed progress in all parts of Federation activities but it was not in the work of the regular committees where progress took on a new direction. This fact does not detract from the work of the regular committees, as their productions manifest the continuing progress of the Federation, particularly along technical lines.

As examples, we need only look at the strong Detroit technical program to see the excellent production of the Publications and Program Committee,

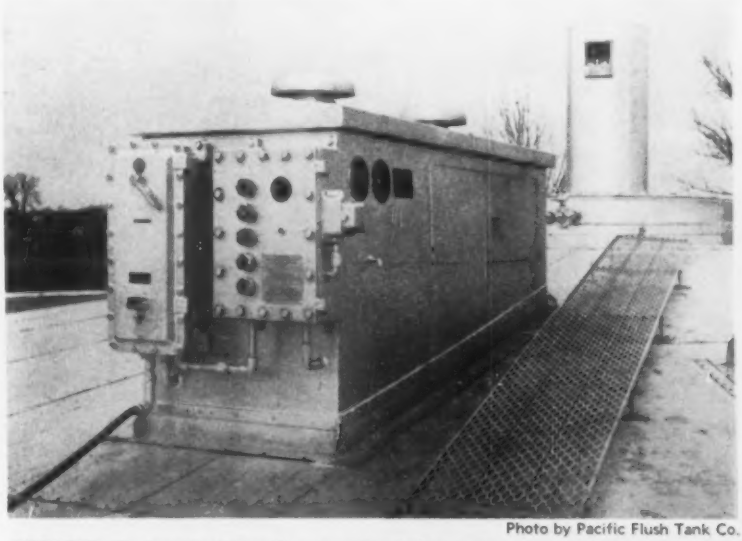


Photo by Pacific Flush Tank Co.

DECATUR, Ill., installed Pearth gas recirculation system on old floating-cover digester.

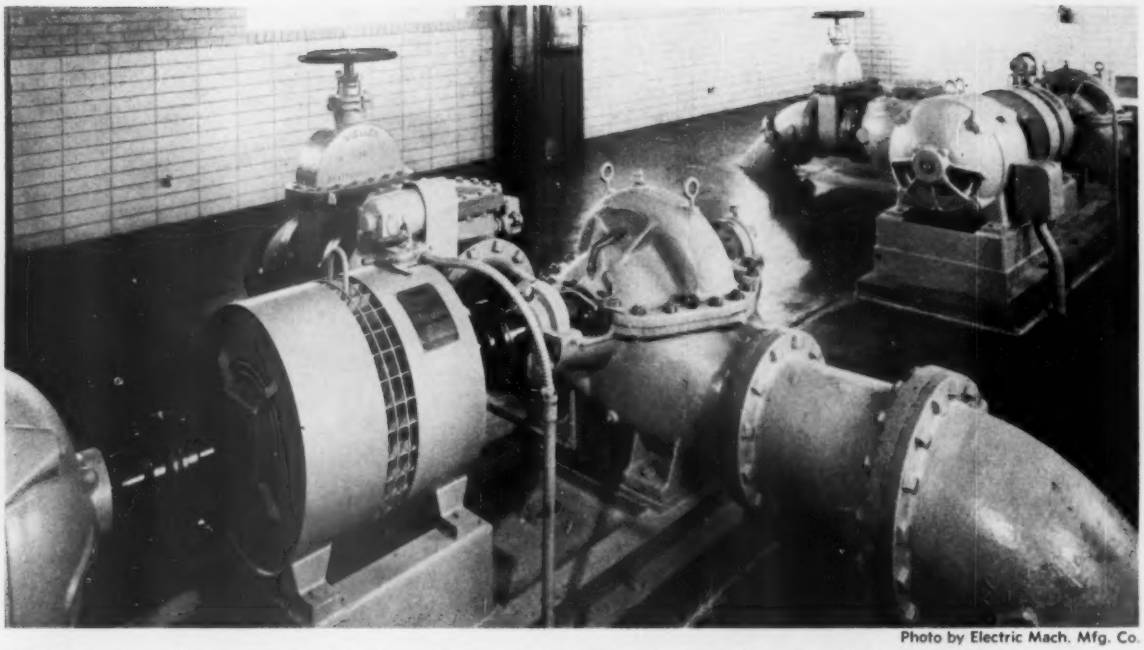


Photo by Electric Mach. Mfg. Co.

ODESSA, Tex., utilizes magnetic drive to vary the speed of effluent pumps to meet variations in flow.

or the progress of manual production to see the similar progress of the Sewage and Industrial Wastes Practice Committee. Others, in some cases with less specific asssignments, are making major contributions to the advancement of the field of wastewater treatment and those engaged in it.

In his introductory remarks to the Board of Control, Past President Kenneth S. Watson enumerated the specific challenges facing the Federation as (1) assistance to operators of small and medium sized plants in all efforts necessary to achieve greater recognition by them, (2) recruitment of membership particularly from the industrial wastes field, (3) improved public relations that would help inform all persons of the important work performed in their communities by Federation members, (4) contribution of activity in the nuclear wastes field initiated by a committee the year before, (5) attraction of new men to the field and (6) activities for the general professional advancement of those in the field.

Mr. Watson stressed particularly the high priority of public relations and cited the needs for (1) publicity beyond our ordinary technical publications, (2) broader awards program and (3) a study of semantics aimed at the development of more appealing terminology for sewage, industrial wastes and related terms. Further, he urged consideration of an organization name change, indicating that a shorter and more appealing name would be a definite advance.

Mr. Watson also urged all members to think of these matters and share their thoughts with others. From the standpoint of professional advancement, he felt that operator's certification should be advanced and that efforts should be exerted toward improved salaries of operators. Also, he felt definite financing by public bodies should be encouraged for the support of meeting attendance at both local and national meetings.

Sparked by this statement, committees were delegated to consider some of these items in the course of the Federation meeting and their report was made to the Board of Control assembled in Detroit on October 9, 1958. Perhaps the most sweeping of these activities was the one dealing with increased role of the Fed-

Photo by Klemp Metal Grating Corp.

DANVILLE, Ill., installed galvanized welded grating for walkways over open conduits.

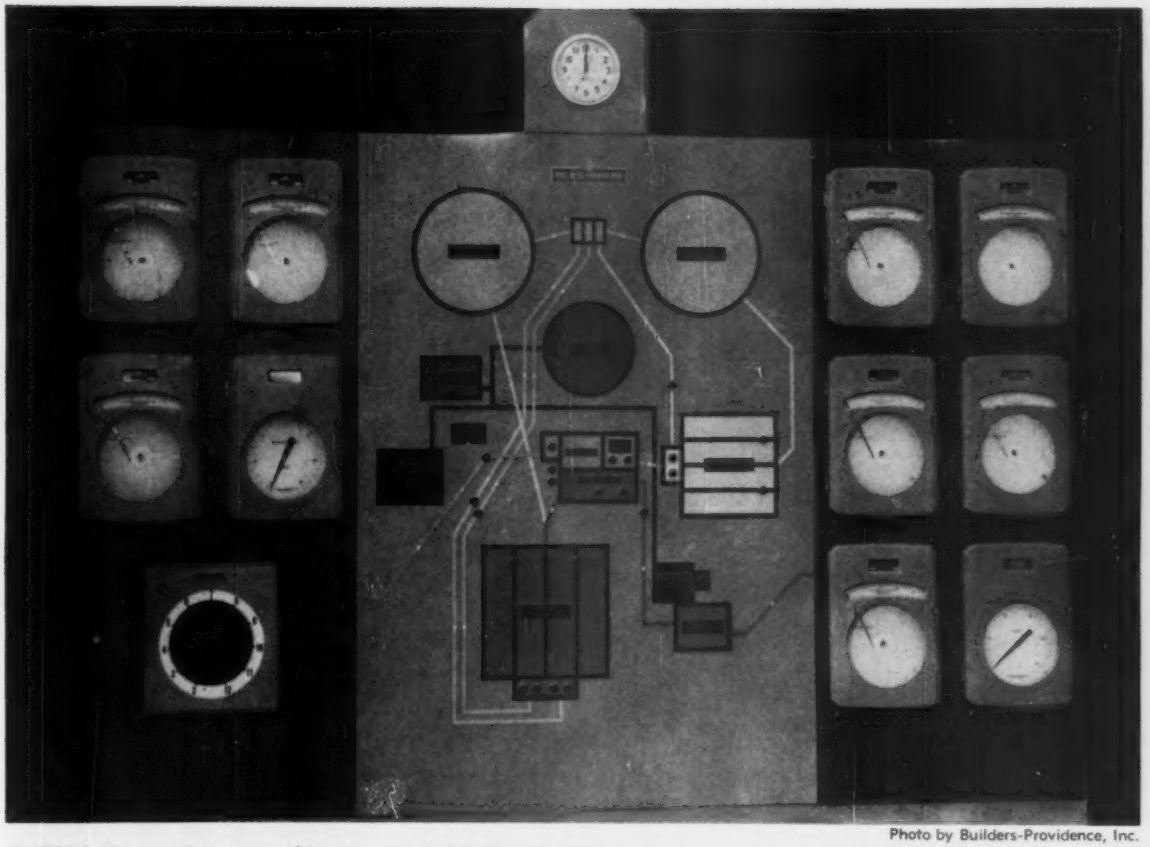


Photo by Builders-Providence, Inc.

FAIRFAX, Va., employs a graphic control panel in its operations.

eration. This subject was studied by both the Finance and Executive Committee and the report recommended that the Federation engage in new activities along two general lines. (1) Professional advancement and (2) improved public relations activities.

Professional advancement would include (a) encouragement of added training for wastewater personnel in all Associations, (b) encouraging and assisting in the development of manuals which will contribute to professional development, (c) furthering of licensing, both voluntary and mandatory, and (d) the evalution of salary levels and study of methods for obtaining equitable compensation for those engaged in wastewater sanitation activities.

Public relations efforts would be directed to (a) better publicity for personnel participating in Member Association and Federation meetings, (b) the development of an approach through mayors, city managers and municipal league organizations for financial support of municipal personnel for Federation, Association and

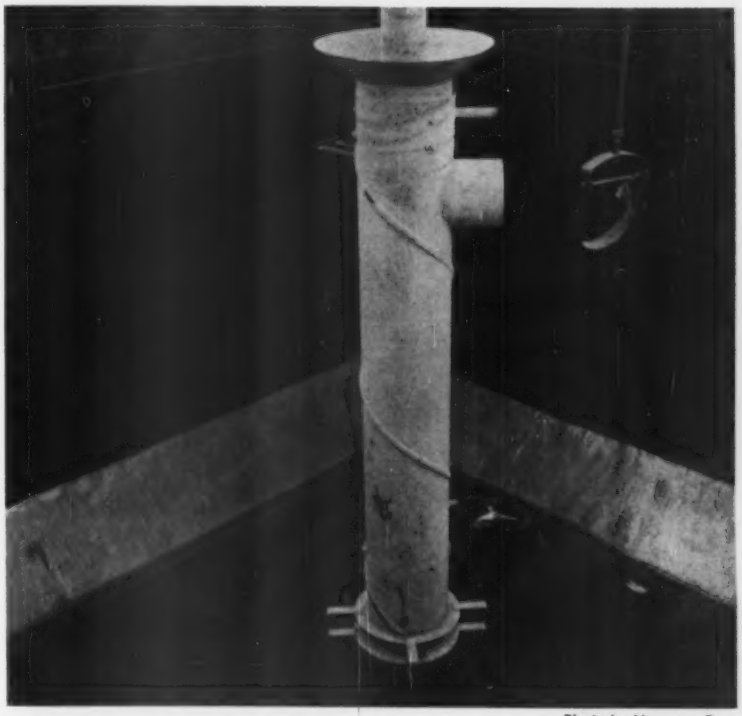


Photo by Yeomans Bros.

STAMBOUGH, Mich. installed Cavitator® aerators with no submerged bearings.

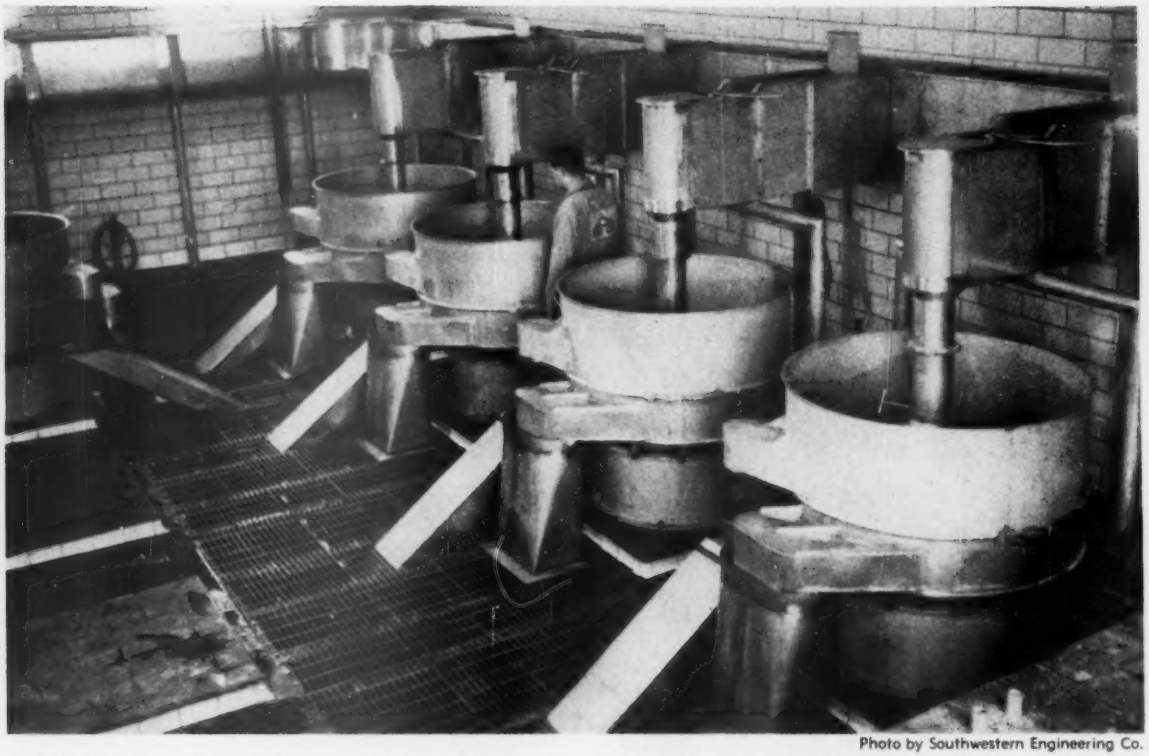


Photo by Southwestern Engineering Co.

GOLDEN, Colo. utilizes a battery of Sweco separators to remove solids from a combined domestic sewage and wastes from a local brewery.

professional advancement activities, (c) more complete award structure for both the Federation and its Member Associations, (d) the development of a packet to help the operator help himself in public relations matters, and (e) a study of semantics for improved terminology in the field with the possibility of a name change.

The Board authorized that these activities be undertaken immediately in spite of the fact that this would cause a deficit for operating expenses during the 1959 calendar year. In the fulfillment of these directives, the Federation will be busily engaged. Many of these activities will be combined with those of Member Associations. Certainly some Member Associations will contribute more, others will gain more, but these efforts will be for the good of all.

If production of manuals should be expedited, then the information contained in them will be of earlier service. The extension of operator's certification will help communities obtain the required service in the operation of their plants and at the same time will bring realistic salary levels where they do not now exist.

The attack on the public relations problems will have to be on a modest basis as the hiring of outside experts is not anticipated.

An activity that will require the most careful thought and consideration will be that of considering possibilities for an organization name change. There is general agreement that the organization's name is longer than it need be and as it stands now, the name is not as fully expressive as certainly a long name should be.

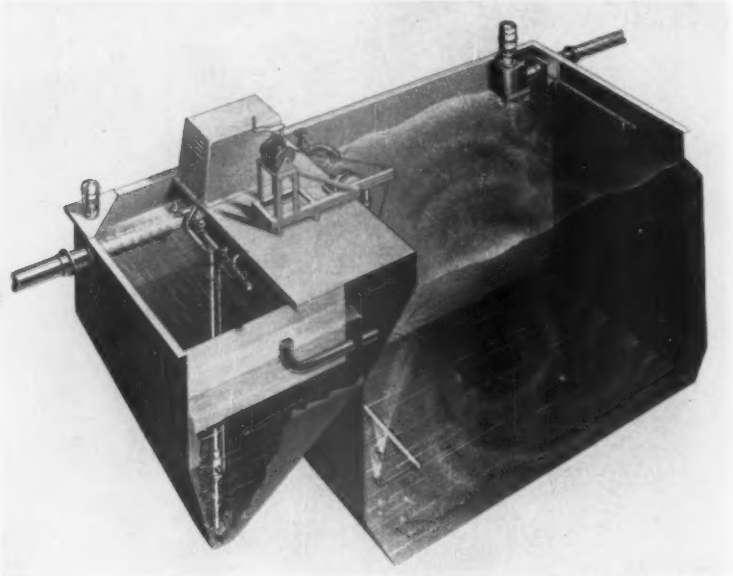


Photo by Chicago Pump Co.

SMALL UNIT sewage treatment process equipment for 20 to 5000 persons was introduced during 1958.

With the hope that some improvements can be suggested, a special committee has been appointed to consider this from the angle that those inside the organization as well as those outside so that with a proper study of semantics it will be possible to make suggestions for the Board's consideration in October, 1959.

In connection with this endeavor, synonyms for "sewage and industrial wastes" are sought from the standpoint of possibly using such a term in a name as well as providing palatable synonyms for the term. As has been used previously, "wastewater" makes an interesting possibility and follows the use which has already been made by British and American authors. Actually this term may be found defined in the "Glossary—Water and Sewage Control Engineering," prepared by the FSIWA, AWWA, ASCE and APHA, several years ago. Other possibilities include abwater, hydrowastes, spent water, and used water. Other suggestions are welcomed and should be sent to the Federation office for reference to the appropriate committee.

Another action of great import is the stand taken by the Federation Board of Control on the Water Pollution Control Act. On this matter, the Federation has set aside its past policy of opposing the principal of Federal grants and has passed a resolution supporting the Federal Grant Program as it relates to pollution control works.

The successful operation of the Water Pollution Control Act in recent years has brought out the realization that such works are being built at a greater rate than probably would have been the case without a Federal Grant-In-Aid Program. Since it is a primary objective of the Federation to achieve pollution abatement by the proper design, construction and operation of treatment works, the encouragement of such works through the Federal program was considered to be in harmony with the Federation's objective.

As a result, the Federation will support the amendments proposed by Congressman Blatnick in doubling the amount of grants from $50 million per year to $100 million per year probably starting July 1, 1959. At the same time, other modifications are advocated for the Bill which would promote the construction of treatment works. It seems that in this way a real mark can be made in the backlog of such projects.

Federation members who are eager to see the Federation objective of pollution abatement fulfilled, are now assured that maximum assistance may be anticipated from the Federal program. In years gone by, some have said that the stand of the Federation has not been known on such issues. The action of the 1959 Board certainly leaves no question of this kind.

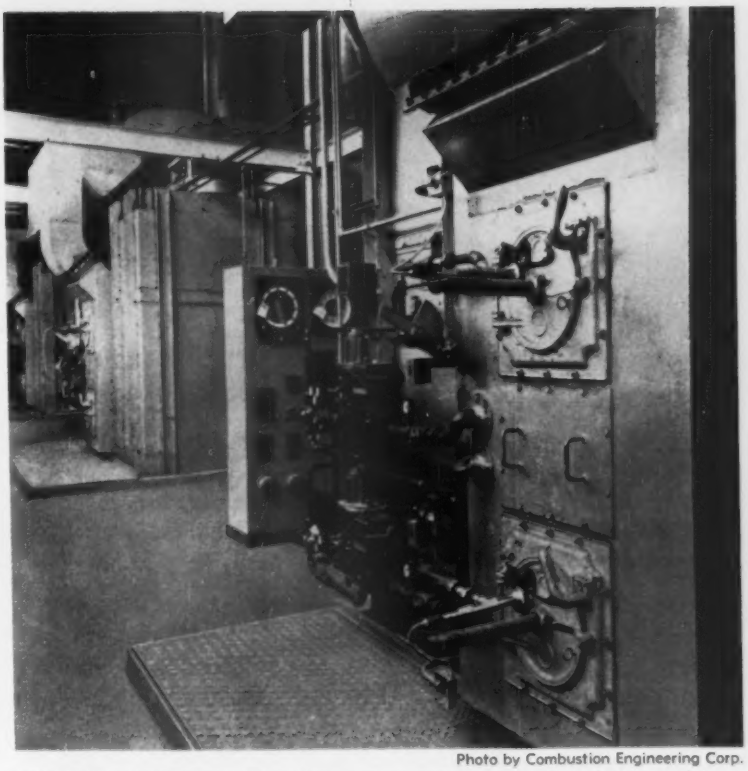


Photo by Combustion Engineering Corp.

WARREN, Mich. installed the flash drying system for sludge drying and/or incineration; natural gas is used as the auxiliary fuel.

Photo by Smith & Loveless, Inc.

ANOTHER unit termed the "Oxigest" was introduced for subdivisions, schools, motels and industrial plants.

Many studies in many locations account for . . .

Research Progress *in Water and Sewage*

by HARRY A. FABER, Research Coordinator
Engineering Resources Program
U. S. Public Health Service, Washington, D. C.

AUTHOR'S NOTE: A summary review of research in water and sewage can only serve to highlight activities in the field. This review is neither comprehensive nor critical, but has been prepared to illustrate the variety of investigations underway in laboratories, in treatment plants, and in other areas. The references cited are articles which have appeared in technical journals, generally within the period November 1957 through October 1958.

The need for research frequently is noted as though the research was an end in itself. It is not: while the immediate or ultimate practical return from research usually is difficult to evaluate, our continuing progress in solving problems clearly depends upon applying the results of research.

■ "RESEARCH has paid handsomely in design and operation of the South District filtration plant," are the words John R. Baylis used[1] in discussing the subject. He noted that the technical staff of the Water Purification Division of the Chicago Bureau of Water, in addition to conducting many routine tests, is well organized for research work. "This is advancing our knowledge of water purification and is resulting in the production of water of the highest quality for Chicago." Baylis listed twelve specific studies under way, most being of the applied research type; certain studies, however, are quite basic in nature—such as the use of the electron microscope for bacteriological studies and for research on the coagulation process.

Research—Who is Doing What?

There is in preparation an annual inventory of research underway in water, sewage, and industrial wastes studies: according to preliminary data some 300 individual projects will be included. This record is expected to provide useful information needed to determine how much research is being done and who is doing it.

A continuing record is available of water supply and water pollution control research supported by the research grants program of the U. S. Public Health Service. This program started in 1947, when 3 grants totalling $57,000 were supported, and has increased substantially in recent years: in 1958, 84 grants totalling $822,000 were supported.

The national laboratory of the Public Health Service, the Robert A. Taft Sanitary Engineering Center at Cincinnati, conducts many research projects in water supply and water pollution control. The laboratory and pilot plant investigations in this field constitute the principal emphasis at the Center. A review of these activities reported[2] that, in addition to operation of the Water Quality Basic Data Network, projects of special interest include: studies of coagulant aids in water treatment; research on viruses and their possible significance in water; and the development of an automatic dissolved oxygen analyzer.

Research—To Get Water

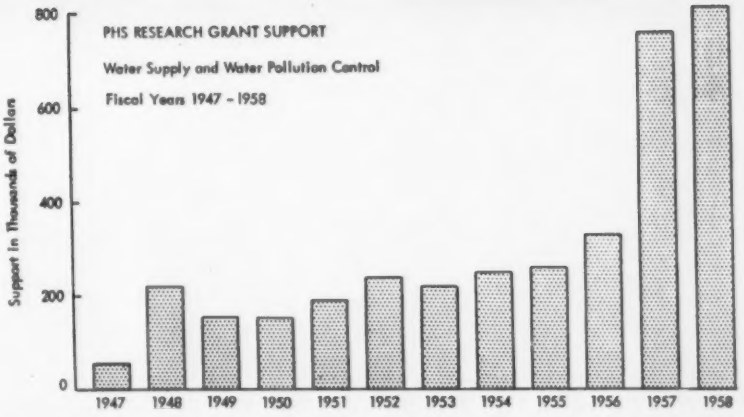
Water is a raw material: to obtain an adequate supply at each location where it is needed presents research problems of primary importance. Studies of these problems are underway and are reported in technical articles.

Rainfall can be induced in relatively small cumulus clouds where it would not form naturally. Field experiments cited by Braham and Battan[3] indicated that the release of water spray inside the clouds provides one successful method of initiating precipitation.

The quality of rainfall changes once it reaches the earth. Problems of water supply quality, according to Bethlahmy and Anderson,[4] begin in the watershed—before the water reaches reservoirs. The City of Portland, Ore., has undertaken cooperative studies on watershed research with the U. S. Forest Service in order to solve certain problems of water supply quality.

The supply of water may be increased by artificial ground water recharge. According to the report of an AWWA Task Group,[5] there are advantages and disadvantages to this practice: there is a sharp increase in the number of states regulating underground disposal of water, while a comparable increase of interest in artificial ground water recharge is reflected by the growing number of experimental projects of this nature in operation.

How rapidly will progress in the conversion of saline water provide potable water on any substantial scale? There is great present interest in this possibility; more, apparently, from the development than from the research point of view. The large-scale use of desalting processes for sea water is presently limited to distillation. Howe[6] reported that improved techniques have reduced by one-half the cost of potable water produced by the multi-effect process, but that the costs are still too high to compete with water obtained from precipitation sources. The combined power generation — distillation method holds promise under certain conditions, but solar distillation is not yet economical in spite of the "free" solar energy.



RESEARCH GRANTS are providing increased support for studies of water supply and water pollution control problems.

Research—To Save Water

Once a supply of water is available as a raw material, the next need is to conserve it: this involves new research problems.

The use of hexadeconal as a monomolecular film to reduce reservoir evaporation has been under study in recent years, and Berger[7] reported on research studies concerning the toxicity of this material: (a) hexadeconal poses no direct problem in fish toxicity, (b) applying hexadeconal in the manner and concentrations proposed will produce no discernible effect on water treatment processes, and (c) microbiological attack could produce loss of hexadeconal and reduce film-spreading efficiency. USPHS is interested in extending its laboratory studies to full-field experiments, in order to help determine the practical value of conserving water by this procedure.

Problems that will be involved in full-scale application of this treatment were reviewed by Stephens[8] in reporting on work of the Southwest Water Evaporation Research Council. He noted that there were still many questions to be answered before satisfactory and economical application methods are developed for large reservoirs and lakes (1,000 surface acres and larger).

The artificial recharge of water-bearing formations constitutes a growing method of water conservation. Muegge[9] explains a variety of reasons for research studies of this practice, recommending that water utilities should participate. Continuing studies in Wisconsin will include investigation of the use and re-use of water by industry, especially in conserving cooling water by recharge to ground water.

Chanute, Kan., undertook a full-scale research project that must be recognized as a project of historic importance. The report prepared by a groups of authors,[10] of the use by that city of reclaimed water for a potable supply during emergency drought conditions, describes how recirculated treated sewage effluent provided the major supply of raw water. One complete cycle required about 20 days. The sewage treatment process included trickling filters and a stabilization pond. The water treatment plant was unable to practice free residual chlorination for taste and odor control or for color removal. Additional problems included frothing in the recarbonation basin and in filters during backwashing; coagulation and settling were less effective; plugging and coating of filter sand took place; and false high residual chlorine readings by the OTA test. No known cases of waterborne disease or other adverse effects on health resulted from this practice during the 5 months it was followed.

Research—To Treat Water

Research problems in the treatment of water are without end, since they reflect both new needs for information and new problems of water pollution.

The significance of monitoring stream water quality was reviewed by Hartung, Megregian, Cleary, and Streicher.[11] Experience has demonstrated, according to Hartung, the value of a monitoring program on the Missouri River. Research is underway to protect the public water supply industry against pollution conditions which cause impairment of raw water sources. Megregian cited examples of the information revealed by development of water quality data on a nation-wide basis. This "intelligence service" of the USPHS will, as a water monitoring network, provide data for interstate and international streams in the form of an annual Federal publication. Cleary reported on progress in the design of a robot monitoring device, as an analytical instrument to continuously record and transmit data on water quality; on the utility of such a device; and its engineering and economic feasibility. Streicher described the chemical, biological, and radiological monitoring programs in effect along the Colorado River, and their role in detection of river pollution.

Studies were made of the utility of natural and synthetic polyelectrolytes as coagulant aids. Cohen, Rourke, and Woodward[12] reported studies of the utility of commercial materials in coagulating natural and prepared turbid waters. Their data summarized benefits and precautions relating to plant scale use of these coagulant aids.

At present, chemical coagulation appears to provide the most applicable method for removal of radioactivity from water. Setter and Russell[13] studied the effectiveness of coagulating radioactive rain, cistern, and surface waters, using alum, lime, and coagulant aids for the removal of fallout activity. Their results showed that chemicals and dosages used in

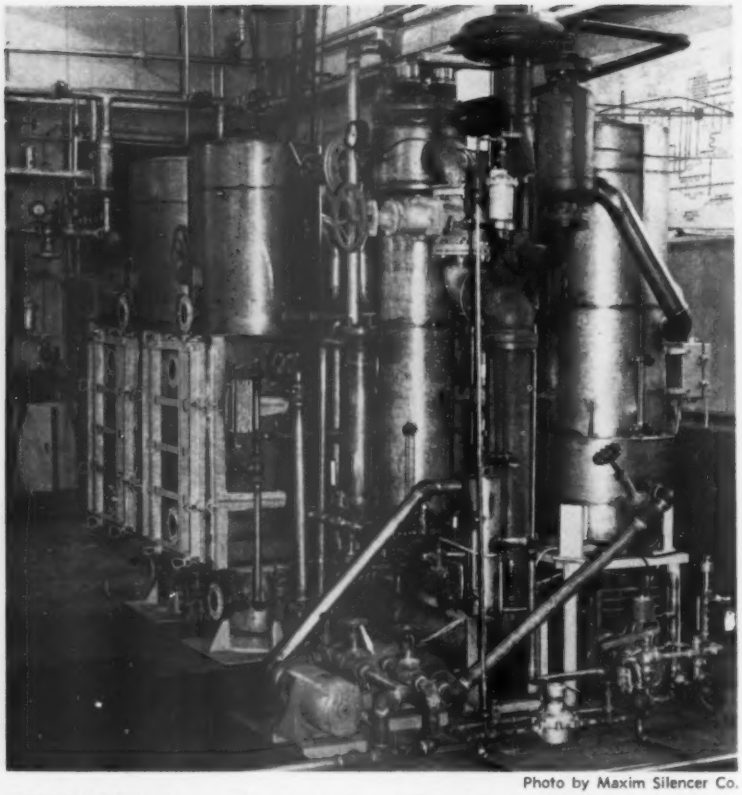


Photo by Maxim Silencer Co.

CONVERSION of sea water to fresh is still largely by distillation at few locations; this 20,000 gpd unit is installed at Castle Harbor Hotel in Bermuda.

conventional water treatment practices can remove all of the suspended beta activity and part of the soluble activity. It is increasingly difficult to remove soluble beta activity with longer exposure of this activity to natural purification.

Improved control methods for coagulant dosage are certainly needed. Granstrom and Shearer[14] presented results of investigating a conductometric method for this purpose, and reported that essentially all turbidity was removed at dosages of alum less than those at which the break in the conductivity curve occurred. The location of the break appeared to be determined by the alkalinity of the water, not by the alum dosage optimum for colloid removal.

Filtration rates are affected by several factors. Studies reported by Hudson[15] included raw water quality, the availability and management of pretreatment facilities, as well as the sand characteristics and hydraulic conditions of the filter itself. The determination of safe filtration rates was explained on the basis of accurate measurements and of records extending over an adequate length of time.

The operation on plant scale of new treatment and control features at the St. Louis County Water Co., South County Plant, was described by Hartung.[16] These included a suspended solids contact lime softening unit operated to obtain near-stability of calcium carbonate by holding in suspension 5,000 mg/L or more of previously precipitated solids; distribution of coagulant and chlorine dosages across the 100-ft wide treatment basin; and a novel filter unit without clear well or rate of flow controller.

Problems of iron and manganese removal were studied by Riddick, Lindsay, and Tomassi[17] who reported that difficulty is seldom encountered in the removal of iron. Manganese is difficult to remove in a standard type of water treatment plant or by low-cost methods. Removal methods and the solution of special operating problems were reviewed.

The presence of hydrogen sulfide in high concentrations also creates special water treatment problems. Foxworthy and Gray[18] described methods developed to remove hydrogen sulfide and methane from well water in southern California.

A full scale study of chlorine residuals in the Gary-Hobart, Ind., water distribution system was reported by Plowman and Rademacher.[19] Their data demonstrated that a combined available chlorine residual can be made to persist throughout an extended distribution system, though it would be affected by local factors. This study revealed the significance of temperature: at a temperature above 65°F, a rise of only 3 to 5°F resulted in marked loss of residual; records of residual levels in the system indicated that little or no loss of residual is encountered during those times of the year when the water temperature is below 65°F.

An original method of preparing a silicon dioxide-sodium silicofluoride sol has been developed by Henry.[20] The method described is simple, rapid, and economical. Three functions are performed by the chemicals employed in this method, as they activate sodium silicate, fluoridate water, and also contribute active coagulating silica from their hydrolysis.

Summary statements of several research projects in the water field were reported.[21] Included are studies by Stumm on the corrosivity of water to iron pipe; Hoak on tastes and odors in drinking water; Kiker on iron and sulfur bacteria; Granstrom and Lee on reactions of oxy-chloro compounds; and Garrett on toxicity investigations.

Research—To Test Water

There is a continuing need for new and improved methods of water analysis: only research will develop these methods.

A water works laboratory cannot readily determine the presence of virus, but Kelly and Sanderson[22] studied the possible use of bacterial disinfection as a guide to indicating virus inactivation. They reported that the usual conditions for disinfection, i.e., free residual chlorine concentrations of about 0.2 to 0.3 mg/L for a 10-min contact period at pH 7.0, will not completely inactivate an enteric virus; viruses are inactivated if the contact period is extended to 30-min. A contact period of at least 4 hours, and a residual of 0.7 mg/L is required

for viruses to be inactivated by continued residual chlorine. Several strains of viruses are listed in decreasing order of sensitivity to chlorine, and the effect of temperature and pH value were discussed in detail.

Research continues to be devoted to improving the utility of the membrane filter method for bacteriological examination. Fifield and Schaufus[23] described a medium for use in this technique which resulted in colonies having clear sheen characteristics and produced a high rate of coliform group recovery.

Methods for the cultivation and classification of iron bacteria were reported by Wolfe,[24] who provided useful illustrations and descriptions.

A new technique for jar testing of coagulation, was presented by Cohen.[25] The test has the advantages of providing reproducible results and a permanent record for future study; the need for personal judgment and experience is minimized; small but important differences in coagulation results are detectable; and the method actually constitutes a new research tool.

New concentration and identification techniques were developed by Middleton, Rice, and Burttschell[26] which enable water utilities to assess organic contamination not now being measured. By such techniques, basic data on organic pollution can be determined; the effectiveness of removal by treatment processes may be measured; and clues may be provided as to the source and composition of pollutants.

A new method for the determination of nitrates in water was developed by Greenberg, Rossum, Moskowitz, and Villarruz.[27] The modified brucine procedure they have developed was reported to be appreciably simpler, less time-consuming, more precise and accurate than the standard methods now available.

Comprehensive toxicological methods for establishing drinking water standards were reviewed. Stockinger and Woodward[28] reported a basis for approach to this increasingly complex problem, citing: (a) safe limits of toxic substances in the air of industrial environments, or maximal acceptable concentration values; (b) the toxicological tolerances for pesticide residues on foods; (c) toxicological information relating to nutritional studies; and toxicity classifications based on chemical structure relationships.

VIRUS STUDIES at PHS Sanitary Engineering Center involve tissue culture techniques new to water research.

Research—To Use Water

In order to resolve conflicts in water use, in terms of what is optimal for the whole nation, progress must be made in establishing values of water. Renshaw[29] summarized methods of making comparisons within and between seven water use categories: domestic, industrial, irrigation, power, waste disposal, inland navigation, and commercial fisheries. Further studies of evaluating various types of water demands are needed.

A study of water use for air conditioning in Ames, Iowa, was made by Seidel and Carpenter.[30] They developed close correlation between climate, in terms of degree-days above 65°F, and water use by representative local air conditioning installations.

Research—To Treat Sewage

Research problems in the treatment of water-borne municipal wastes are perhaps even more numerous and more complex than problems in water treatment.

Sewer odórs may require that treatment be provided even before the sewage reaches a treatment plant. Beardsley, Krotinger, and Rigdon[31] have developed a method by which such odors can be removed by scrubbing discharged sewer gases with alkaline solutions, using rotary evaporative coolers. They described the design and advantages of this equipment; it can be made to operate automatically either by pH control or constant flow.

Sewage itself provides a definite group of filamentous fungi which can become acclimated to an aquatic environment. Cooke[32] reported the results of research indicating these fungi become naturally adapted to the highly specialized conditions of a sewage treatment plant. His report reviewed the nutritional requirements of nine common sewage fungi, and noted how they have developed by strain selection from soil-inhabiting ancestors.

Englebrecht and McKinney[33] studied activated sludge cultures developed on structurally-related chemical compounds. They found that such sludges both have similar morphological appearances and produce similar biochemical changes. They also found that the loss of nitrogen during aeration of activated sludge cultures precludes the development of accurate nitrogen balances.

When the relationship between volatile acids concentration and methane gas production from sludge digestion was studied by Schulze and Raju,[34] it developed that, independent of the pH value, gas rates decreased below the optimum level for all cases in which the volatile acids concentration had increased beyond a critical level. These experiments show that, even at

pH ranges from 7.2 to 7.8, an increase in the volatile acids concentration may result in an impaired gas production.

Temperature affects the efficiency of anaerobic digesters, according to the findings reported by C. G. Golueke.[35] A study of the efficiency of the performance of these digesters operating at 30°C up through 65°C showed best results with the digesters operating in the temperature range of 35° to 60°C. No significant difference in results could be noted in that range.

Results of experimental investigations on lagoons by Hermann and Gloyna,[36] have been reported for laboratory models and outdoor pilot plants, using natural and synthetic sewages. The results indicate that waste stabilization ponds may be designed and operated so as to accomplish all of the functions provided by conventional sewage treatment plants. With adequate operational control, BOD loadings may be much higher than those currently applied in practice, especially in the warmer areas. From the comprehensive data obtained from Texas State Department of Health on various installations in operation in that State, these researchers have made a statistical analysis[37] and presented the results numerically in a series of six tables.

Reduction of coliform bacteria in primary sewage sludge to most probable numbers below 100 per 100 ml has been attained under specific experimental conditions by Connell, Dreyer, and Berg.[38] Chlorine and iodine residuals had approximately the same colicidal activity. The required effective bromine doses were approximately twice, and the required iodine doses were two-thirds those required for chlorine.

Research—To Treat Industrial Waste

Tapleshay[39] has found that total oxidation of organic wastes can be accomplished in simply designed waste treatment plants requiring a minimum of maintenance and control. Design of the plant determines the degree of treatment obtained or the "rating" of the system; therefore, the equipment used for treatment has been titled the rated-aeration process. This process is particularly suited to treat the wastes from schools, motels, factories, dairies, small subdivisions, and a variety of industries. It accomplishes BOD reductions of 15 to 90 per cent with an effluent BOD of less than 20 mg/L when treating normal domestic sewage.

Lawton and Eggert[40] found, when studying the effect of concentrated whey on sewage treatment processes, that highly saline wastes can be stabilized by biological treatment, provided sharp changes in the sodium chloride concentration do not occur. Filter growths developed from low salt content wastes do suffer a shock effect when high salt content wastes were applied to them, but usually become acclimated to the high salt diet in from one to five days.

Problems encountered and processes employed by oil refiners to prevent stream pollution were described by Burroughs and Sample.[41] The methods are expensive, and some of them create other disposal problems. The oil industry is working actively in developing waste disposal methods and is meeting considerable success through installation of facilties whose installation and operating costs are high.

Details of design and operation of the Armour Leather Company's new treatment plant at Williamsport, Penna., were described by Haseltine.[42] Incinerator operation has been satisfactory, although the poor yield of the high-moisture filter cake has materially increased oil consumption over that expected. Chlorination is employed for treatment of the tannery waste-holding tank.

Textile mill wastes contain a number of components which cause rapid degradation of receiving rivers, but some mill wastes also include one or more factors which retard or prevent immediate biological action unless there is appreciable dilution. Ingols[43] has described how, with careful design, it is possible to provide treatment of textile wastes by lagooning, trickling filters, or activated sludge, but each method has its advantages and limitations.

Research—To Test Wastes

McKee and McLaughlin[44] have described experiments and data they obtained from the bacterial assay of settled domestic sewage. They compared the results of molecular filter techniques, using serial dilutions and variable sample sizes, with those from conventional MPN procedures. They concluded that molecular filter techniques are applicable to the bacterial survey of raw settled sewage, and that the results obtained thereby are comparable to those from confirmed MPN procedures.

When settled sewage is subjected to disinfection by heat or ultra-sonic vibration, the surviving coliform population can be assayed by the membrane filter technique or by the MPN procedure with results that are approximately comparable. For chlorinated sewage, however, growth on membrane filters falls short of the most probable number. McKee, McLaughlin, and Les Gourges[45] suggest that this discrepency for chlorinated sewage is attributable to the partial reversibility of some of the chemical reactions whereby monochloramine inactivates enzyme systems of bacteria.

Grune and Chueh[46] have pointed out that present theories and explanations for applying redox potentials to waste treatment practice still are not fully understood or established. Conclusions which can be drawn about redox potentials in aerobic waste treatment concern: (a) the time needed to establish a stabilized potential, (b) the potentials as a function of temperature, (c) the variation of O-R potential with different layers in a digester, and (d) the apparent potentials of both raw and well-digested sludge and their rates of change under proper seeding and temperature conditions.

The results of research on laboratory sludge digesters equipped with redox potential cells are presented by Grune and Lotze.[47] One digester contained radioactive phosphorus; the other was a control. The authors concluded that an excellent correlation between ORP and digestion progress can be obtained. They believe that properly applied ORP and pH measurements will offer a convenient and valuable means to improve the economical operation of sludge digesters.

Nitrification causes serious errors in BOD measurements on pure organic compounds where the test is continued beyond five days, and nitrification must be prevented in some manner if reliable carbonaceous BOD values are to be obtained. Gaffney and Heukelekian[48] described four methods of eliminating nitrification error from the BOD tests.

Can stream pollutants be evaluated satisfactorily in terms of the BOD value alone? Bogan[49] reported that because biochemical oxidation can create serious problems, tests aimed at assessing oxygen requirements have a practical meaning and value. His findings indicate that the BOD values observed for many substances may be related to degradation of a portion of the molecule only. In the case of the alkyl benzene sulfonates much of the oxidation observed appears to have been centered in the alkyl groups.

Research—To Dispose of Effluent

A useful article by Cleary[50] discussed the very real need for the assembly and interpretation of data relating to water pollution control. He described these "vital data" and why they are needed. He summarized information on administrative practices of the States with regard to industrial waste discharges and expressed the wish that the Public Health Service will be able to publish vital information frequently.

Krone, Orlob, and Hodgkinson[51] have investigated the movement of coliform bacteria through porous media. They found that the first contaminated water to arrive includes the bacteria that have travelled with moving water farthest from the periphery of the stream where the removal potential is greatest. Ultimately, virtually all bacteria are removed by the medium, or their movement is sufficiently retarded so that natural bactericidal forces prevail. They stated that more reliable data are needed on both the physical characteristics of bacteria and on the clustering phenomenon as related to liquid recovery.

From his study of crop irrigation with sewage effluent, Dye[52] concludes that use of sewage is well justified by the results obtained. He points out that sewage irrigation makes use of water (nutritional water as a rule) usually wasted, aids the economy of areas, reduces pollution loads on a receiving stream (especially a dry stream) and produces, with a few adaptations, no hazards to operators and others.

Dilution of sewage effluent in sea water offers a convenient and satisfactory method of disposal for many coastal communities, as reported by Lawrence,[53] but the phenomena involved in the dilution of effluent by sea water through ocean outfalls and diffusers are complex and deserving of attention by engineering disigners. In appraising performance of existing ocean outfalls, careful consideration should be given to the laboratory procedures adopted, and to their accuracy and significance. Much scientific and engineering knowledge developed on this subject should be valuable to engineers and others engaged in the design and operation of ocean outfall disposal works.

RADIOACTIVITY studies at Georgia Institute of Technology include counting of liquid and solid portions of sludges.

Summary statements of several research projects in the sewage and wastes field were reported.[54] These includes studies by Dunlop on the survival of pathogenic organisms in sewage; McCarthy and Rosenthall on the biological treatment of tannery wastes; Dobbins on the treatment of radioactive laundry wastes; McGaughey on studies of detergent breakdown; and Rand on variation of surface reaeration rates of water containing sewage.

Acknowledgment

The assistance of Howard C. Young, Senior Sanitary Engineer, Water Supply and Water Pollution Control Program, U. S. Public Health Service, who contributed substantially to the preparation of this review is gratefully acknowledged.

References

1. Baylis, John R. "Research." *Pure Water*, 10:19 (Feb., (1958). (Published by Bureau of Water, Chicago, Illinois).
2. Sanitary Engineering Center. "From Ohio River Surveys to a Clinic for Sanitary Engineering Problems." *Public Works*, 88:12:75, (Dec., 1957).
3. Braham Roscoe, R. Jr., and Battan, Louis J. "Effects of Seeding Cumulus Clouds." *Jour. A.W.W.A.*, 50:185 (1958).
4. Bethlahmy, Nedavia and Anderson, Kenneth. "Watershed Research in Portland, Ore." *Jour. A.W.W.A.*, 50:110 (1958).
5. Task Group Report. "Developments in Artificial Ground Water Recharge." *Jour. A.W.W.A.*, 50:865 (1958).
6. Howe, Everett D. "Progress in Conversion of Saline Water." *Jour. A.W.W.A.*, 50:319 (1958).
7. Berger, Bernard B. "Use of Hexadecanol in Reservoir Evaporation Reduction." *Jour. A.W.W.A.*, 50:855 (1958).
8. Stephens, Uel. "Research and Experiments in Evaporation Reduction." *Jour. A.W.W.A.*, 50:846 (1958).
9. Muegge, O. J. "Artificial Recharging of Water-Bearing Formations" *Jour. A.W.W.A.*, 50:168 (1958).
10. Metzler, Dwight F., et al. "Emergency Use of Reclaimed Water for Potable Supply at Chanute, Kan." *Jour. A.W.W.A.*, 50:1021 (1958).
11. Hartung Herbert O., et al. "Monitoring of Stream Water Quality." *Jour. A.W.W.A.*, 50:1211 (1958).
12. Cohen, Jesse M., Rourke, George A., & Woodward, Richard L. "Natural and Synthetic Polyelectrolytes as Coagulant. Aids." *Jour. A.W.W.A.*, 50:463 (1958).
13. Setter, Lloyd R., & Russell, Helen H. "Chemical Coagulation Studies on Removal of Radioactivity in Waters." *Jour. A.W.W.A.*, 50:590 (1958).
14. Granstrom, Marvin L., & Shearer, S. David. "Conductometric Control of Coagulant Dosage in Treatment Plants." *Jour. A.W.W.A.*, 50:410 (1958).
15. Hudson, Herbert E. Jr. "Factors Affecting Filtration Rates." *Jour. A.W.W.A.*, 50:271 (1958).
16. Hartung, Herbert O. "Treatment Plant Innovations in St. Louis County, Mo." *Jour. A.W.W.A.*, 50:965 (1958).

17. Riddick, Thomas M., Lindsay, Norman L., & Tomassi, Antonio. "Iron and Manganese in Water Supplies." *Jour. A.W.W.A.*, 50:688 (1958).
18. Foxworthy, James E., & Gray, Harley K. "Removal of Hydrogen Sulphide in High Concentrations From Water." *Jour. A.W.W.A.*, 50:872 (1958).
19. Plowman, Herbert L. Jr, & Rademacher, John M. "Persistence of Combined Available Chlorine Residual in Gray-Hobort Distribution System." *Jour. A.W.W.A.*, 50:1250 (1958).
20. Henry, Clarence R. "New Method of Preparing Activated Silica Sol." *Jour. A.W.W.A.*, 50:61 (1958).
21. Series of Research Reports. "Highlights of Research in Sanitary Engineering." *Public Works*, 88:12:78 (December, 1957).
22. Kelley, Sally, & Sanderson, Wallace W. "The Effect of Chlorine in Water on Enteric Viruses." *Am. Jour. of Pub. H'lth*, 48:10:1323 (October, 1958).
23. Fifield, Charles W., & Schaufus, Charles P. "Improved Membrane Filter Medium for the Detection of Coliform Organisms." *Jour. A.W.W.A.*, 50:193 1958).
24. Wolfe, Ralph S. "Cultivation, Morphology, and Classification of the Iron Bacteria." *Jour A.W.W.A.*, 50:1241 (1958).
25. Cohen, Jesse M. "Improved Jar Test Procedure." *Jour. A.W.W.A.*, 49:1425 (1957).
26. Middletown, Francis M., Rosen, Aaron A., & Burttschell, Rice H. "Taste and Odor Research Tools for Water Utilities." *Jour. A.W.W.A.*, 50:21 (1958).
27. Greenberg, Arnold E., et al. "Study of Methods for the Determination of Nitrates." *Jour. A.W.W.A.*, 50:821 (1958).
28. Stokinger, Herbert E., & Woodward, Richard L. "Toxicologic Methods for Establishing Drinking Water Standards." *Jour. A.W.W.A.*, 50:515 (1958).
29. Renshaw, Edward F. "Value of an Acre-Foot of Water." *Jour. A.W.W.A.*, 50:303 (1958).
30. Seidel, Harris F., & Carpenter, John M. "Relationship of Temperature and Air-Conditioning Water Use." *Jour. A.W.W.A.*, 50:226 (1958).
31. Beardsley, C. W., Krotinger, N. J., & Rigdon, J. H. "Removal of Sewer Odors by Scrubbing with Alkaline Solutions." *Sew. and Indus. Wastes*, 30:220 (1958).
32. Cooke, Wm. Bridge. "Nutritional Requirements of Nine Common Sewage Fungi." *Sew. and Indus. Wastes Jour.*, 29:1243 (1957).
33. Englebrecht, Richard S., & McKinney, Ross E. "Activated Sludge Cultures Developed on Pure Organic Compounds." *Sew. and Indus. Wastes Jour.*, 29:1350 (1957).
34. Schulze, K. L., & Raju, B. Naga. "Studies on Sludge Digestion and Methane Fermentation. II. Methane Fermentation of Organic Acids." *Sew. and Indus. Wastes*, 30:164 (1958).
35. Golueke, Clarence G. "Temperature Effects on Anaerobic Digestion of Raw Sewage Sludge." *Sew. and Indus. Wastes*, 30:1225 (1958).
36. Hermann, E. R., & Gloyna, E. F. "Waste Stabilization Ponds. I. Experimental Investigations." *Sew. and Indus. Wastes*, 30:511 (1958).
37. Hermann, E. R., & Gloyna, E. F. "Waste Stabilization Ponds. II. Field Practices." *Sew. and Indus. Wastes*, 30:646 (1958).
38. Connell, C. H., Dreyer, Donald A., & Berg, E. J. M. "Reduction of Coliform Bacteria in Sewage Sludge by Halogens." *Sew. and Indus. Wastes*, 30:634 (1958).
39. Tapleshay, John A. "Total Oxidation Treatment of Organic Wastes." *Sew. and Indus. Wastes*, 30:652 (1958).
40. Lawton, Gerald W., & Eggert, Clarence V. "Effect of High Sodium Chloride Concentration on Trickling Filter Slimes." *Sew. and Indus. Wastes*, 29:1228 (1957).
41. Burroughs, L. C., & Sample, G. E. "Pollution Control at Shell Oil Refineries." *Sew. and Indus. Wastes*, 30:57 (1958).
42. Haseltine, T. R. "Tannery Wastes Treatment With Sewage at Williamsport, Pa." *Sew. and Indus. Wastes*, 30:65 (1958).
43. Ingols, Robert S. "Textile Waste Problems." *Sew. and Indus. Wastes*, 30:1273 (1958).
44. McKee, Jack E., & McLaughlin, Ronald T. "Application of Molecular Filter Techniques to the Bacterial Assay of Sewage. II. Experimental Results for Settled Sewage." *Sew. and Indus. Wastes*, 30:129 (1958).
45. McKee, Jack E., McLaughlin, Ronald T., & Lesgourgues, Pierre. "Application of Molecular Filter Techniques to the Bacterial Assay of Sewage. III. Effects of Physical and Chemical Disinfection." *Sew. and Indus. Wastes*, 30:245 (1958).
46. Grune, Werner N., & Chueh, Chun-Fei. "Redox Potentials in Waste Treatment-Laboratory Experiences and Applications." *Sew. and Indus. Wastes*, 30:479 (1958).
47. Grune, Werner N., & Lotze, T. H. "Redox Potential as a New Tool in Sludge Digestion." *Water & Sewage Works*, 105:37 (January, 1958).
48. Gaffney, P. E., & Heukelekian, H. "Oxygen Demand Measurement Errors in Pure Organic Compounds—Nitrification Studies." *Sew. and Indus. Wastes*, 30:503 (1958).
49. Bogan, R. H. "Biochemical Degradation Products—A New Dimension in Stream Pollution." *Sew. and Indus. Wastes*, 30:208 (1958).
50. Cleary, Edward J. "Observations on Vital Data for Streams." *Sew. and Indus. Wastes*, 30:800 (1958).
51. Krone, R. G., Orlob, G. T., & Hodgkinson, Carl. "Movement of Coliform Bacteria Through Porous Media." *Sew. and Indus. Wastes*, 30:1 (1958).
52. Dye, E. O. "Crop Irrigation with Sewage Effluent." *Sew. and Indus. Wastes*, 30:825 (1958).
53. Lawrence, Charles H. "Sewage Effluent Dilution in Sea Water." *Water & Sewage Works*, 105:116 (March, 1958).
54. Series of Research Reports. "Highlights of Research in Sanitary Engineering." *Public Works*, 88:12:80 (December, 1957).

Basic Course for Water and Sewage Plant Operators Held at Penna. State Univ.

The Basic Course for all operating personnel new to the fields of water and sewage treatment, and a refresher course for those already in the fields, was held Nov. 17 to 21, 1958. The Course is a prerequisite for attendance at any of the Penn State advanced courses offered in water and sewage treatment.

The subject outline of course was as follows:

History of Water and Sewage Treatment	1 hour
Practical Plant Mathematics	4 hours
Characteristics and Safe Handling of Chlorine	1 hour
Principles of Disinfection with Chlorine	1 hour
Elementary Bacteriology	2 hours
Water- and Sewage-Borne Communicable Diseases	1 hour
Water Treatment Plant Processes and Equipment	4 hours
Sewage Treatment Plant Processes and Equipment	4 hours
Water and Sewage Plant Control Tests	1 hour
Requirements of State Health Department	1 hour
Elementary Hydrology	1 hour
Public Relations	1 hour
Examination	1½ hours

The Basic Course will also be given on a demand basis in any area of Pennsylvania, provided there are at least 20 operators in attendance. This course would be given locally in a segmented fashion and would consist of 6 sessions of 4 hours each; or a total of 24 hours of instruction. The sessions would be conducted once a week for six consecutive weeks.

Information for a local Basic Course can be obtained by contacting Frank A. Kohler, Jr., short course coordinator for the Dept. of Civil Engineering, The Pennsylvania State University, University Park, Pa.

Those attending all sessions and completing the examination satisfactorily will receive a certificate from the University. The certificate is an aid in securing registration under the voluntary certification program operated by the PSIWA and PWWOA.

Photo by Johns-Manville

PROVIDENCE, R. I. installed Transite pipe to increase its water distribution system.. This was but one one example of . . .

Construction *During 1958*

by ROLLAND W. SIMPSON and ROBERT W. MERZ
Contributing Editors, WATER & SEWAGE WORKS

EDITOR'S NOTE: Mr. Simpson is Chief Sanitary Engineer of Gilbert Associates, Inc. of Reading, Pa., and Mr. Merz is Professor of Civil Engineering, University of Southern California, Los Angeles, Calif. These authors present here a brief review of the outstanding construction during the past year on the west coast and in the east. Other sections of the country are not covered in this review because we were unable to arrange for such information in time for inclusion in this report.

■ FROM A SLOW START in the early months of the year, construction of water and sewage works spiralled to a record breaking high for 1958 throughout the entire country. Mid-year forecasts indicated an increase in water works construction of 8.4 per cent and sewage works construction of 8.0 per cent over 1957.

Sewage treatment works construction, after a downward trend throughout 1956, began to recover in March, 1957. The upward trend is still continuing; it is interesting to note that during the first six months of 1958 the construction of sewage treatment works in most of the states across the Nation exceeded that for the same period in 1957. Undoubtedly, the Construction Grants Program under the Federal Water Pollution Control Act (P.L. 660—84th Congress) was an influencing factor in recovery from the 1957 recession.

Completed or under construction during 1958 were 144 sewage works projects with an evaluation of approximately $89 million dollars. Seventy-one of these—almost 50 per cent—were aided in varying degree under P.L. 660.

West coast states are among those vigorously engaged in the elimination of waste disposal problems through construction of adequate facilities, but due to the intensity of population in the Eastern States, the bulk of construction of these facilities occurred in this area.

In order to determine the extent of construction of both water and

Table 1
Water Works Projects

Municipality	Population	Facilities
ALABAMA		
York	1,774(1)	Capacity—400 gpm—Distribution mains, 200,000 gal. Elev. stor. raw water intake, chem. precipitation, filt.
Decatur	19,974(1)	Filter plant enlarged from 8 to 12 mgd. Rapid chem. mixer, floc. and filt.
Gadsden	55,725(1)	Filt. plant enlarged from 12 to 15 mgd. Dist. syst. expansion—200,000 gal. Elev. stor., new clear water basin.
DELAWARE		
Smyrna		New drilled well, aeration, chlor., clear well and booster pump.
FLORIDA[2]		
Melbourne	20,000	4.0 mgd cap.—Coagulation
Margate	7,000	1.3 mgd cap.—Lime softening
Country Club Estates	3,850	0.5 mgd cap.—Life softening
Fort Lauderdale, Fiveash Expansion	80,000(2)	8.0 mgd cap.—Lime softening
Driftwood Acres	935	1.0 mgd cap.—Lime softening
Collier Estates	3,250	1.0 mgd cap.—Lime softening
Miami, Alexander Orr Expansion	340,000(2)	34.0 mgd cap.—Lime softening
Lake Worth	34,000	12.0 mgd cap.—Lime softening
Lantana	5,100	1.5 mgd cap.—Aeration and filt.
Riviera Beach	22,600	3.5 mgd—Lime softening
MAINE		
Madawaska Water Co.	5,000	1.0 mgd filt. plant and intake—$200,000.
Bangor Water Dist.	30,000	Transmission main and pumping sta. from Flood's Pond—Chlor. and pH control—$4,000,000.
Brunswick & Topsham Water District	10,000	Taylor Farm supply—gravel-packed well and pump. sta.
Yarmouth Water Dist.	2,000	Gravel-packed well and pump house—$400,000 including trans. mains.
MARYLAND		
Damacus		System and treatment plant
Sherwood Forest		System and treatment plant
Epping Forest		System and treatment plant
Rockville	20,000	Potomac river intake, filt. plant—transmission main—2.0 mil gal storage dist. sys. improvements—$2,600,000.
NORTH CAROLINA		
Wilmington Air Force Facility		Renovations and additions to system—$91,303
Black Creek	316	Water tank—$22,200
Cape Hatteras	500	Treatment plant and stor. tank—$64,200
Four Oaks	942	Complete system—$170,200
High Point		System improvements
Lexington	15,761	Coag. and rapid sand filt.—$487,000
Oxford	8,565	Coag. and rapid sand filt.—$803,000
Randleman	2,090	Coag. and rapid sand filt.—$153,460
Red Springs	2,742	Aeration and filt.—325 gpm—$235,800
Robbins	1,289	Coag. and rapid sand filt.—$218,180
Silver City	2,721	Coag. and rapid sand filt.—$78,240
Statesville	20,860	Coag. and rapid sand filt.—$147,000
Warrenton	1,179	Chlor. and filt.—200 gpm—$151,500
Wilmington	53,482	Add. to Coag. and rapid sand filt—$93,000
Winston-Salem	100,000	Improve. coag. and rapid sand filt.—20 mgd—$42,000
OHIO[1,4]		
Akron	274,605	Raw water impound. res. on bridge creek—$2,000,000

sewage works during 1958, Health Department Officials in most of the states were contacted for construction data. Unfortunately, it was not possible to obtain complete data from all States contacted. However, details of water and sewage facilities were supplied by State Officials from Alabama, California, Delaware, Florida, Maine, Maryland, Massachusetts, North Carolina, Ohio, Oregon, Rhode Island, South Carolina, Virginia, Washington, and West Virginia. Recognizing that the information received from these States is not a complete picture the data must be considered as indicators of the trend.

Table 1 includes data on water works projects in the east, Table 2, sewage works projects in the east, and Table 3 sewage works projects on the west coast.

Water Projects in the East

Review of the data obtained indicates that water works projects to serve 2,932,889 persons in 12 states in the east, were completed or under construction during 1958. No cost data were available for some of the projects; however, where cost data were obtained, the costs were analyzed by types of projects.

Filter plants were constructed in these 12 states to serve 1,119,121 persons, at a cost of $28,425,080. On this basis, the cost per capita for filter

Photo by the Preload Co.

EL PASO, TEX. installed two 2 mil gal prestressed concrete water tanks, 104 ft in dia and 31 ft 6 in. high.

Photo by Gulf-Seal, Inc.

TULAROSA, N. MEX. restored to service, a cracked seeping monolithic reservoir by lining bottom and side walls.

Water Works Projects (Cont'd.)

Municipality	Population	Facilities
Athens	11,660	Iron remov. and water soft. plant—$467,000
Cincinnati	503,998	Ohio River intake tunned and raw water pump. sta.—$5,500,000
Cleveland	914,808	Clague Road filt. plant to serve westerly portion of Cleveland and Cuyahoga Co.—$19,008,000
Lancaster	24,180	Enlarge. existing iron remov. and water soft. plant—$1,415,000
Mahoning Valley (San. Dist.)	188,426	Raw water pump. sta. and supply line from Berlin Res.—$3,254,000
Marion	33,817	Improve. existing water soft. plant—$725,000
Massillon	29,594	Treatment plant enlarged from 2.4 to 5.1 mgd—$700,000
Sandusky	29,375	Treatment plant enlarged from 9 to 18 mgd—$1,367,000
Springfield	78,508	New well supply, 36 mgd water soft., pump. station and transmission mains—$5,840,000
Archbold	1,486	Treat. plant enlarged from 0.75 mgd to 2.25 mgd—$300,000
Chesterhill	426	Water works system—$97,000
Huron	2,515	Water treatment plant—$784,000
Lagrange	712	Surface water supply and treat. plant—$84,000
Newton Falls	4,451	Treatment plant enlarged from 1.0 mgd to 2.0 mgd—$395,000
North Fairfield	468	Water works system—$112,000
Obetz	1,049	Water works system and treat. plant—$386,000
Seven Mile	569	Water works system—$163,000
Vienna	424	Water works system—$95,000
SOUTH CAROLINA		
Winnsboro		Water treatment plant
Greenville	58,161	Enlarge. raw water supply—impounding dam
Spartanburg		Enlarge raw water supply—impounding dam
VIRGINIA[4]		
Clifton Forge		3.0 mgd filt. plant—$690,000
Chesterfield Co.		2.0 mgd add. to filt. plant, mains, stor. and fire protection—$1,683,000
Newport News		6.0 mgd add. to filt. plant No. 3
Salem		3.0 mgd add. to filter plant, mains and storage—$399,600
Alexandria		8.8 mil gal add. to filt. plant. New 1066 mil gal raw impound. res.
Woodstock		16 mil gal stor. res. and chlorination facilities
Rocky Mount		Major improvements to filter plant
Pulaski		Impound. res. 1062 mil gal—$463,200
WEST VIRGINIA		
Cameron		250 gpm rapid sand filtration plant—$110,000
Martinsburg		Chlor., 1.0 mgd—$1,000,000

NOTES: (1) 1950 Census; (2) Estimated; (3) Representative but not complete; (4) Major Water Supply Projects under construction or completed during 1958.

plant construction was $27.50. The largest project reported was the Clague Filter Plant for the City of Cleveland.

A well supply was reported for only one municipality.

New systems, which would include supply and distribution lines, were reported for four small municipalities serving a total of 1887 persons at a cost of $486,000 amounting to $245 per capita served.

Softening plants, with iron removal, were constructed to serve 148,165 persons at a cost of $8,447,000 or a unit cost per capita of $57.00.

Distribution systems extensions, with transmission mains and pumping stations were reported to serve 724,424 persons at a total cost of $12,954,000, or $16.50 per capita.

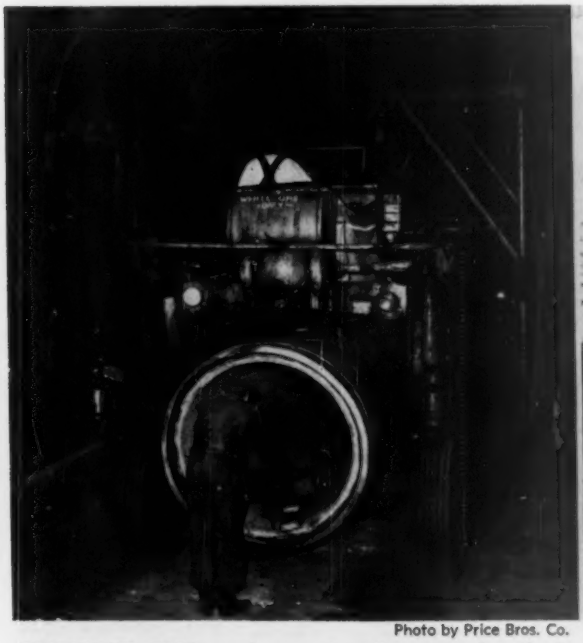


Photo by Price Bros. Co.

CINCINNATI, OHIO used unusual equipment and methods to install 11,000 ft of 48-in. concrete steel cylinder pressure pipe in unused subway tunnel; total length of line, 14,000 ft.

Photo by Amer. Concrete Pipe Assn.

CONSTRUCTION of 60-in. sanitary interceptor, required well points and utilized crane equipment. Note safety helmets on workmen.

Table 2
Sewage Works Projects

Municipality	Population	Facilities
	MAINE	
Winthrop Sewer Dist.		Treatment plant
	MARYLAND	
Emmitsburg		Sewer. system and treat. plant
North Beach		Sewer. system and treat. plant
Lecnardtown		Treatment plant
Baltimore Co.		Treatment plant
	MASSACHUSETTS	
Billerica Homes—Subdiv.—Billerica	600	75,000 gpd, comminutor, Clarigester, pump station, high rate clarifier and chlor.—$99,740
Longmeadow	11,900	1.31 mgd—Grit chamber, Barminutor, settling tanks, two-stage heated digestors, covered drying beds and chlor. —$254,800.
Billerica—Middlesex Co. House of Correction	1,000	180,000 gpd. Bar rack, Clarigester, high rate trickling filter, secondary settling tank and chlor.—$97,000.
Northampton	30,000	3.0 mgd—Grit chamber, comminutor, primary settling tanks, heated sludge digestion, drying beds, mixing chamber and chlor.—$611,600.
	NORTH CAROLINA	
Ayden	2,570	Sec. treatment plant—0.9 mgd—$292,900—High rate filt.
Carrboro	2,041	Add. to Treatment Plant—$20,540.
Denton	830	Add. to Treatment Plant—high rate trickling filt.—0.15 mgd—$82,900.
Elkin	2,920	0.8 mgd—Primary treatment plant and sewerage improvements $416,728.
Farmville	2,965	0.5 mgd secondary treatment plant with high rate filter—$350,900.
Fayetteville	47,250	9.0 mgd secondary treatment plant with high rate trickling filter—$2,124,900.
Gibsonville	1,948	0.28 mgd secondary treatment plant with high rate filter.
Greensboro	85,315	10.0 mgd aditions to secondary treatment plant with high rate filter.
Harvey Point		Sewage treatment plant—$99,755.
Hickory	15,676	Sewerage improvements—$38,972
		0.75 mgd secondary treatment plant with high rate filter—$287,620.
High Point		Sewerage improvements.
Littletown	1,154	0.27 mgd secondary treatment plant with high rate filter—$201,800.
Louisburg	2,374	0.5 mgd secondary treatment plant with high rate trickling filter —$255,000.
Mocksville	2,128	0.225 mgd secondary treatment plant with high rate trickling filter.
Mount Olive	4,314	0.637 mgd secondary treatment plant with high rate trickling filter —$174,500.
North Wilkesboro	4,308	1.0 mgd primary treatment plant—$397,700.
Red Springs	2,742	0.5 mgd secondary treatment plant with high rate trickling filter.
Rocky Mount	29,241	7.0 mgd alterations and addition to secondary treatment plant with high rate filter—$544,525.
Spring Hope	1,313	0.2 mgd secondary treatment plant with high rate filter—$156,500.
Statesville	20,860	Improvements to secondary treatment plant from 2.0 mgd to 4.0 mgd with high rate filter—$759,300.
Wadesboro	3,538	0.75 mgd secondary treatment plant with high rate filter—$291,700.
Winston-Salem	93,611	18 mgd secondary treatment plant with high rate filter—$3,508,040.
	OHIO	
Ashland	14,287	Improvements to existing sewage treatment plant—$405,000.

Storage facilities, including elevated as well as raw water storage, were reported to serve 274,921 persons at a total cost of $2,022,200, or a unit cost of $7.40 per capita.

For projects where cost data and population were available, the average cost for water projects constructed was approximately $23.00 per capita served, represented by an expenditure of $52,515,280 for 2,270,518 persons.

Fifteen projects were reported with no cost data available. These projects consisted mostly of softening plants in Florida. Twenty-one new or improved filtration plants were reported, one well supply, four new systems, four major softening and iron removal plants, four improvement and addition to distribution systems and pumping stations, and two water storage projects.

It is immediately apparent that construction in the east during 1958 was directed towards filtration of water. The low number of storage projects should be examined, in view of the water shortages occurring throughout the country in recent years.

Numerically, Ohio reported the greatest number of projects completed or under construction.

The data reviewed indicated that many of the projects were for small municipalities. Of the total of 51 municipalities where population data were available, the projects may be classified by population as follows:

Photo by Armco Drainage & Metal Products Inc.

ATLANTA, GA., installed 8216 ft of steel pipe to supply additional water for industrial and residential growth in South Fulton County.

Photo by Dresser Mfg. Div.

PORTLAND, ORE., used steel pipe and Dresser Couplings on a new 108-in. intake structure.

Sewage Works Projects (Cont'd.)

Municipality	Population	Facilities
Campbell	12,882	New treatment plant—$621,000.
Cincinnati	503,998	New Mill Creek treatment plant—$24,741,000.
Cleveland	914,808	Additions to Southerly sewage treatment plant—$2,240,000.
Columbus	375,901	Additional secondary treatment facilities at existing plant—$3,970,000.
East Liverpool	24,217	New treatment plant—$1,000,000.
Euclid	41,396	New treatment plant—$5,071,000.
Fairborn	7,847	New treatment plant—$1,200,000.
Hamilton	57,951	New treatment plant—$2,768,000.
Mansfield	43,564	New treatment plant—$4,165,000.
Napoleon	5,335	New treatment plant—$662,000.
New Boston	5,449	New treatment plant—$204,000.
Painesville	14,432	New treatment plant—$570,000.
Piqua	17,447	New treatment plant—$975,000.
Sandusky	29,375	New treatment plant—$1,950,000.
Toledo	303,616	New secondary treatment works and improvements to existing works $8,307,000.
Wellsville	7,854	New treatment plant—$420,000.
Willoughby-Eastlake	13,088	New treatment plant—$933,000.
Zanesville	40,517	New treatment plant—$1,005,000.
Bedford Heights	4,940	New treatment plant—$540,000.
Brewster	1,618	New treatment plant—$125,000.
Brilliant	2,066	New treatment plant—$115,000.
Brook Park	2,606	New treatment plant—$434,500.
Canal Fulton	1,258	New treatment plant—$75,000.
Continental	1,023	New treatment plant—$164,000.
Deshler	1,623	New Sewage Pump Station, force main and sewage stabilization pond—$118,000.
Flushing	1,158	New treatment plant—$75,000.
Leipsic	1,706	New treatment plant—$200,000.
Leroy	320	New treatment plant—$122,000.
Lowellville	2,227	New treatment plant—$204,000.
Millersburg	2,398	New treatment plant—$199,000.
Montpelier	3,867	New treatment plant—$300,000.
Northfield	780	New treatment plant—$90,000.
Oak Harbor	2,370	New treatment plant—$271,000.
Perrysburg	4,006	New treatment plant—$325,000.
Rockford	1,112	New treatment plant—$110,000.
Seaman	736	New treatment plant—$75,000.
Shiloh	655	New treatment plant—$105,000.
South Zanesville	1,477	New treatment plant—$102,000.
Tiltonville	2,202	New treatment plant—$229,000.
Washingtonville	848	New treatment plant—$55,000.
Waterville	1,110	New treatment plant—$85,000.
Waynesburg	1,258	New treatment plant—$70,000.
Yorkville	1,854	New treatment plant—$200,000.
RHODE ISLAND		
Exeter—Ladd State School	1,000	Settling tanks, trickling filters, secondary settling, separate sludge digestion and chlorination—$300,000.
Providence	280,000	Conversion of existing activated sludge plant to high rate activated sludge or bioabsorption or step aeration. Increased capacity from 40 mgd to 60 mgd—$4,000,000.
SOUTH CAROLINA		
Whitten Village		Complete treatment.
Summerton		90,000 gpd—Complete treatment with thickling filter.
Winnsboro		Complete treatment for 0.6 mgd and improvements to existing plant—$37.50/capita.
Furman University		Modified activated sludge plant—60,000 gpd.
Laurens		Complete treatment plant with trickling filter—1.5 mgd—$52.00/capita.
Marion		Complete treatment for 50% of load—1.0 mgd.
Bennettsville		1.2 mgd primary treatment plant.
Dillon		One new plant—enlargement of existing plant.
North		150,000 gpd complete treatment with trickling filter.
Due West		120,000 gpd complete treatment with trickling filter and pump station.

Photo by Cleveland Trencher Co.

FORT WORTH, TEX., installed new line in machine-dug trench to increase fire hydrant pressure.

Photo by Edward E. Johnson, Inc.

TACOMA, WASH., drilled a new 24-in. well, equipped with a 25 ft Everdur well screen; the well pumped 3000 gpm with 60 ft drawdown.

Table 2—Cont.
Sewage Works Projects

Municipality	Population	Facilities
Easley		Complete treatment and improvements to existing plant—1.0 mgd—$30.08/ capita for plant construction.
VIRGINIA		
Richmond	330,000	70 mgd primary treatment with chlorination—$16,940,000.
Lynchburg	70,000	11 mgd primary treatment with chlorination—$2,750,000.
Clifton Forge	10,000	1.5 mgd primary treatment with chlorination—$430,000.
Berkley Subdiv. (Albemarle Co.)	350	0.035 mgd—Complete treatment with chlorination.
Galax	11,400	11.4 mgd primary treatment with chlorniation—$705,200.
Drakes Branch	575	0.0575 mgd primary treatment with chlorination.
Willow Oaks Country Club	400	0.040 mgd secondary treatment.
Reynolds Metals Co. (Chesterfield Co.)	300	0.0105 mgd secondary treatment.
Berryville	2,500	0.25 mgd secondary treatment with chlorination.
Herndon	3,000	0.30 mgd secondary treatment with chlorination—$117,400.
Thompson Products Co.	200	Secondary treatment.
Stanleytown (Stanley Furniture Co.)	500	Secondary treatment.
Hechler Village	5,000	0.5 mgd secondary treatment with chlorination.
Louisa	750	0.075 mgd secondary treatment with chlorination—$167,000.
Crewe	3,000	0.30 mgd secondary treatment with chlorination—$120,000.
Aragona Village	3,000	0.30 mgd secondary treatment with chlorination.
Farmville	840	0.12 mgd secondary treatment.
Dumfries Sanitary District	3,000	0.30 mgd secondary treatment with chlorination.
Elkton	3,000	0.30 mgd primary treatment with chlorination.
Mount Jackson	1,500	0.15 mgd primary treatment with chlorination—$95,325.
Carbo, A.E.P. Co.	200	Secondary treatment.
Ferry Farms (Stafford Co.)	1,000	0.10 mgd secondary treatment with chlorination.
Camp Sequoya (Washington Co.)	270	Secondary treatment.
Denbigh Area (Newport News)	1,280	0.128 mgd secondary treatment with chlorination.
Stony Brook Estates (Newport News)	2,450	0.245 mgd secondary treatment with chlorination.
Colonial Beach	8,000	0.80 mgd primary treatment with chlorination—$326,000.
Glasgow	1,200	0.125 mgd primary treatment with chlorination—$232,473.
Warrenton	6,000	0.5 mgd secondary treatment with chlorination—$467,652.
Woodstock	3,000	0.3 mgd secondary treatment with chlorination.
Charlottesville	20,270	2.5 mgd secondary treatment with chlorination—$1,053,480.
Danville	70,000	7.0 mgd primary treatment with chlorination—$1,975,000.
Suffolk	20,000	2.0 mgd secondary treatment with chlorination.
Pulaski	20,000	2.0 mgd secondary treatment with chlorination—$914,743.
WEST VIRGINIA		
Newell	3,000	Primary treatment with chlorination.
Williamstown	5,000	0.5 mgd primary treatment with chlorination—$120,000.
Moundsville	25,000	Primary treatment with chlorination.
Ravenswood	3,000	Primary treatment with chlorination—$131,000.
Glen Dale	3,000	Primary treatment with chlorination.
Charleston	120,000	Primary treatment with chlorination.
New Martinsville	12,000	Two plants. Primary treatment with chlorination.
Weirton	40,000	Primary treatment with chlorination.

Table 3
West Coast Sewage Works Projects

Location	New Plants: Completed	New Plants: Under Construction	New Plants: Cost	Plant Additions, Sewers, Misc.: Completed	Plant Additions, Sewers, Misc.: Under Construction	Plant Additions, Sewers, Misc.: Cost	Total Cost	No. of Projects: Total	No. of Projects: Under P.L. 660
California	9	23	$19,013,000	11	51	$58,684,000	$77,697,000	94	37
Oregon	6	13	5,799,000	2	2	141,000	5,940,000	23	17
Washington	13	14	5,121,000	*	*		5,121,000	27	17
Totals	28	50	$29,933,000	13	53	$58,825,000	$88,758,000	144	71

* Not reported separately

Less than 1000	9
1000 to 5000	13
5000 to 10,000	4
10,000 to 50,000	14
50,000 to 100,000	5
More than 100,000	6

It is obvious that most of the projects reported served less than 100,000 persons.

Sewage Projects in the East

Review of the data catalogued from the various Eastern States, where population data were available, indicated that sewage projects to serve 3,944,675 persons were completed or under construction during 1958. No cost data for some of the projects were available; however, again as with the water projects, where cost data obtained, the costs were analyzed for review and discussion.

Based on plants serving 3,617,443 persons, cost data indicates a total of $107,407,950 was spent on 83 projects, or an average per capita cost of $29.60.

Primary treatment plants were designed to serve 559,828 persons at a cost of $25,485,538, or an average cost of $45.50 per capita. This value is influenced by data for the City of Richmond, Va., where a primary plant was reported for 330,000 persons at a cost of $16,940,000, or $50.42 per capita.

Secondary treatment plants were designed to serve 960,233 persons, at a cost of $24,544,840, or an average cost of $25.50 per capita. This value appears low, but it is influenced by the City of Columbus, Ohio, where secondary treatment facilities were added to an existing plant, at a per capita cost of $10.30.

Plants, unclassified as to the type of treatment, were constructed to serve 1,815,759 persons at a total cost of $53,259,572, or an average cost of $28.30 per capita served.

Photo by U. S. Pipe & Foundry Co.

DECATUR, ALA., installed nearly 3 miles of 14 and 16-in. TYTON JOINT® cast iron pipe for sewer force mains in connection with a major sewer system improvement program.

Two plants, to serve 281,623 persons, were constructed at a cost of $4,118,000. The first plant, consisting of a pumping station and stabilization pond cost $118,000 for 1623 persons, or $72.50 per capita. The second plant at Providence, R. I. serving 280,000 persons, cost $4,000,000 (or $14.30 per capita) for conversion of an existing activated sludge plant to a high rate activated sludge and/or bioabsorption plant.

Further study of the data, indicates that the primary type treatment plants were designed to treat 108.96 mgd, at the cost of $25,485,538. On this basis, the cost per million gallon design basis was $235,500. The secondary type treatment plants were designed to treat 46.512 mgd, at the cost of $24,544,840. On this basis, the cost per million gallon design basis was $530,000.

Data including population and cost were available for a total of 83 plants, including 15 primary type, 23 secondary type, 43 unclassified as to type, and 2 miscellaneous type.

Population figures indicate that many of the projects were for small municipalities. The 83 plants may be classified by population served as follows:

Less than 1000	8
1000 to 5000	38
5000 to 10,000	7
10,000 to 50,000	20
50,000 to 100,000	4
More than 100,000	6

Based on the type of secondary treatment, nearly all plants reported utilized trickling filters, mostly of the high rate type.

Although there were only 83 plants reported with sufficient data to analyze population and costs, there were actually 119 plants constructed in the east. Of this total, 105 were new plants, and the remaining 14 alterations or additions to existing facilities.

Sewage Projects in the West Coast

Without question, the largest and most outstanding project underway encompasses the modifications to the Hyperion plant of the City of Los Angeles, California. Total contracts in the amount of some $41 million dollars have been let to (1) construct a new land outfall, (2) modify and enlarge the existing treatment facilities, (3) construct an ocean outfall and pumping plant to discharge digested sludge seven miles offshore at a depth of 320 feet, and (4) construct an ocean outfall and pumping plant to discharge effluent five miles offshore at a depth of 200 feet. The land outfall, additional primary tanks, and sludge outfall, representing nearly 50 per cent of the work, have been virtually completed.

With regard to the State of California itself, completed or under construction were 93 projects with an evaluation of approximately $37 million dollars. The largest projects were those of Ukiah, Richmond, and the Camarillo Sanitary District. Thirty-seven of the projects have been aided by grants under P.L. 660.

California's immediate neighbor to the north, Oregon, has also been carrying on the construction of sewerage projects at an accelerated pace during 1958. Completed or under construction were 23 projects with an evaluation of approximately $6 million dollars. The largest projects were those of the South Suburban Sanitary District (Klamath Falls), the City of Klamath Falls, and the City of Roseburg. Nine of the plants are of the trickling filter type, and two are modified activated sludge. Six communities are constructing lagoons. Seventeen of the projects have been aided by grants under P.L. 660.

Within the past eight years, the State of Washington has experienced marked progress in sewage treatment. Whereas in 1950 there were less than 100 plants serving approximately one-half million people, by the close of 1958 there were more than 200 plants serving one and one-quarter million residents. At the same time, approximately 60 per cent of the state's population was served by sewers. The year 1958 brought sewage treatment to an additional 12 per cent of the Washington population.

Completed or under construction were 27 projects with an evaluation of approximately 5 million dollars.

Sewage flow determined through the application of . . .

Time Recorder-Totalizers *at Sewage Lift Stations*

by GEORGE W. WELSH, JR., Deputy Chief, Bureau of Operation, Dept. of Public Works, Baltimore County, Md.

EDITOR'S NOTE: A time recorder-totalizer is being used at sewage lift stations to determine the number of operations of the pumps and the time during each operation. In addition to ascertaining the quantity of sewage pumped, the maintenance and cycle adjustments of the pumps can be easily supervised. Maximum, minimum, and peak periods of flow can also be related to the chronologically recorded time and frequency chart-roll register.

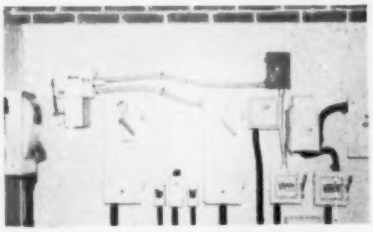


FIG. 1—WALL-MOUNTED controls and Time Recorder-Totalizer.

■ THE BALTIMORE COUNTY Department of Public Works has within its jurisdiction sixty sewage pumping stations. Pumps range from 4 inch to 12 inch in size and have capacities of from 100 GPM to 7,500 gpm. At a few of these stations venturi meters have been installed. The installation of a magnetic recorder is planned for one of the newer stations.

The Bureau needed a method of collecting information on operating and maintenance costs for each of the sixty units as they related to total pumpage. A monthly record of cost verse pumpage was desired.

The Standard Instrument Corp. manufactures a Time Recorder-Totalizer designed primarily to monitor the efficient use of men and machines in industry. Plant or office production is surveyed by this equipment which records the time and frequency of machine, process or system operation and computes the total "on" time chronologically on tape. The Time Totalizer can be furnished to register in hours or tenths of hours; or in minutes and tenth of minutes.

The Baltimore County Bureau began experimenting with this equipment in an effort to obtain data from which station pumping costs could be determined. Figure 1 shows an installation of wall mounted controls and recorders at a very old station. Figure 2 shows a newer face mounted control panel with recorder and a section of the control center.

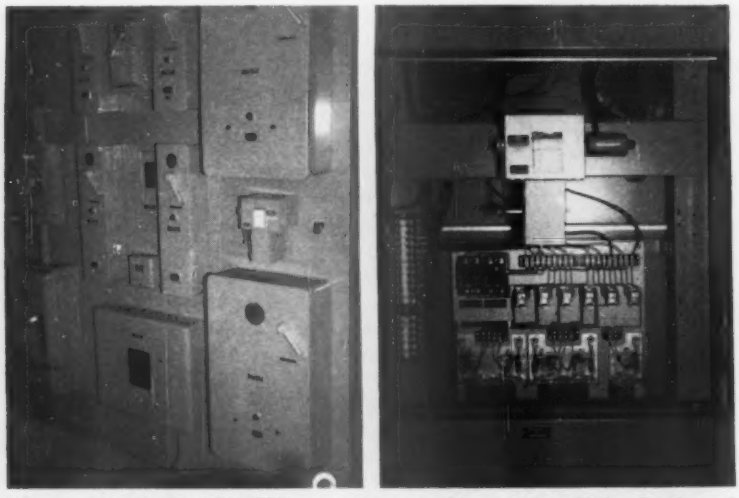


FIG. 2—Left: FACE-MOUNTED control panel with recorder. Right: Section of control center showing Time Recorder-Totalizer.

Basically, The Time Recorder-Totalizers are installed the same at each station. An extra set of contacts is placed in the starter. Power is picked up from the most convenient source and wired through a fused switch for protection. The starter contacts signal each operation of the pump to the recorder.

The stations, which are automatically operated, are visited only once daily by the attendant. He registers the number of operations of the pumps shown on the counter of the Time Recorder-Totalizer and resets the counter to zero. The values are registered daily and submitted to the office monthly. The chart-roll is also received at the office and from the combination of the two, the computations and checks are made. To determine the actual discharge rate of the pumps, a draw-down test is made at each of the stations.

Although the results obtained are not as accurate as those provided by venturi meters and equivalents, the values computed present a fair approximation of the flow through each station. These data enable the bureau to correlate operating costs at the various stations and provide the information necessary for establishing an effective maintenance program.

Photo by Graver Tank & Mfg. Co.

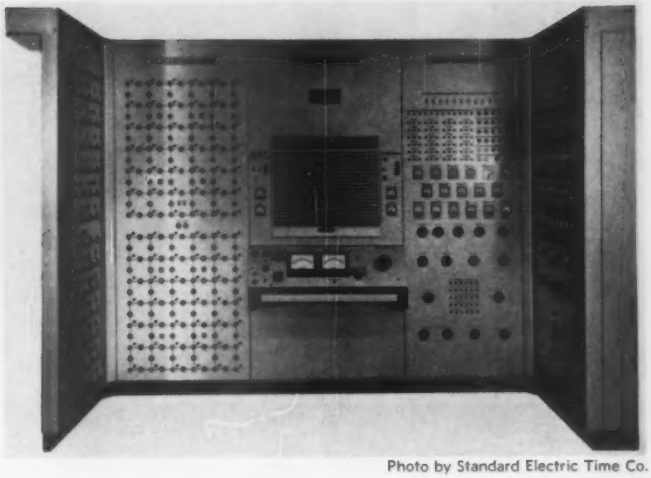


Photo by Standard Electric Time Co.

From — Storage Tank To — Trouble Locater

In 1958, there seemed to be a trend toward the development of more "eye-appeal" in the design of . . .

New Equipment *and New Plants*

by FRED C. MAURER, Assoc. Editor
WATER & SEWAGE WORKS

■ THE NEW EQUIPMENT introduced in 1958, and the new plants built, seemed to forecast a much more "attractive" future for the water and sewage works field.

New plants are being designed that will be artistically attractive, and will blend in with the surrounding terrain, while at the same time maintain highly efficient functional standards.

Equipment manufacturers have been constantly developing new units that lend themselves to this type of architecture. One example is the McElroy network analyzer shown above. Another example is the new booster pump that is inserted directly into the mains, thus eliminating above ground pumping stations. This type of installation also eliminates the noise factor, a distinct advantage when units must be located in residential areas.

Photo by Wheeler Mfg. Corp.
HEAVY DUTY hydraulic pipe cutter.

The inside of both water and sewage plants have also undergone a "face-lifting." New electronic brains, with graphic panels centralize operations of entire systems. Electronic analyzers instantly locate and report trouble, and in some cases can start corrective procedures.

These are but a few of the many innovations in plant equipment in 1958. In the next four pages, a photographic presentation is made of a number of the developments in the past year. Other developments both in plants and equipment appear in other reviews in this issue.

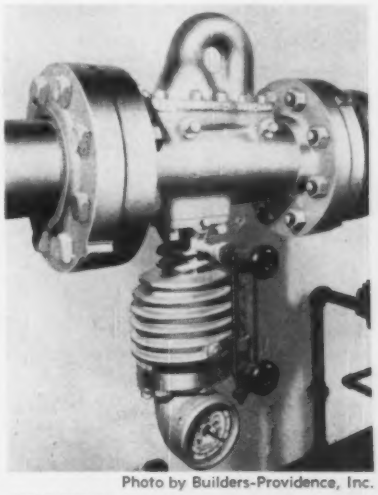


Photo by Builders-Providence, Inc.
SHUNTFLO digester gas meter.

PRESSURE AERATION, pressure filtration and all automatic backwashing are features of this 24 mgd plant at Anacortes, Wash.

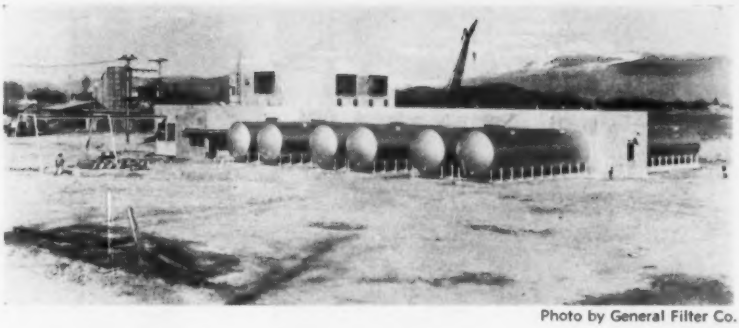


Photo by General Filter Co.

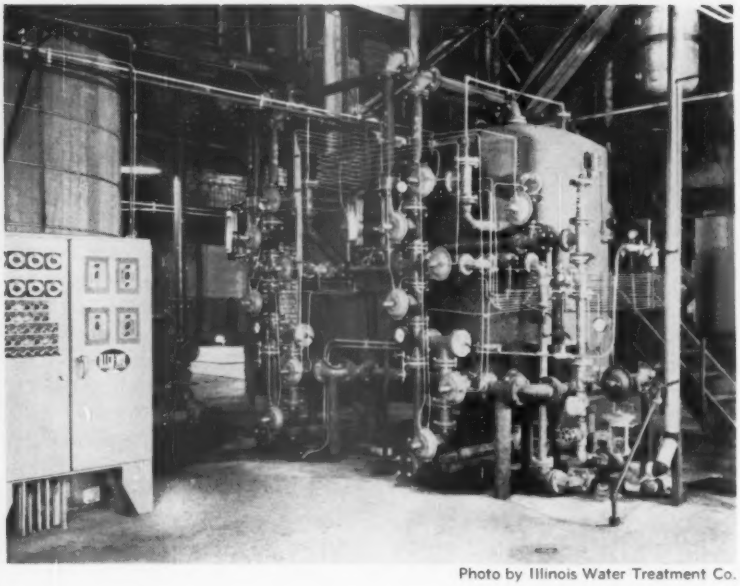


Photo by Illinois Water Treatment Co.

COMPLETELY AUTOMATIC Two-Bed Deionizer furnishes silica-free water for Boilers in Midwestern plant. Automatic controls are pneumatically operated.

DROUGHT PROTECTION is provided for Fort Worth in its new $5 million treatment plant.

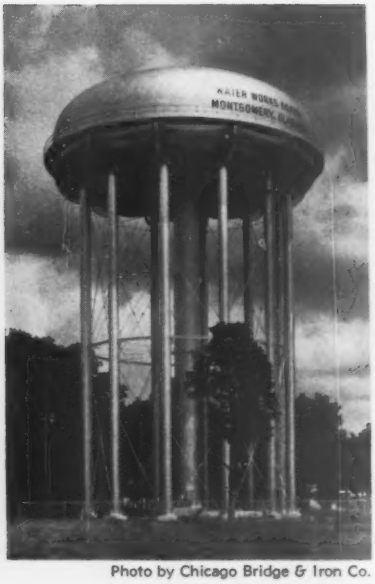


Photo by Chicago Bridge & Iron Co.

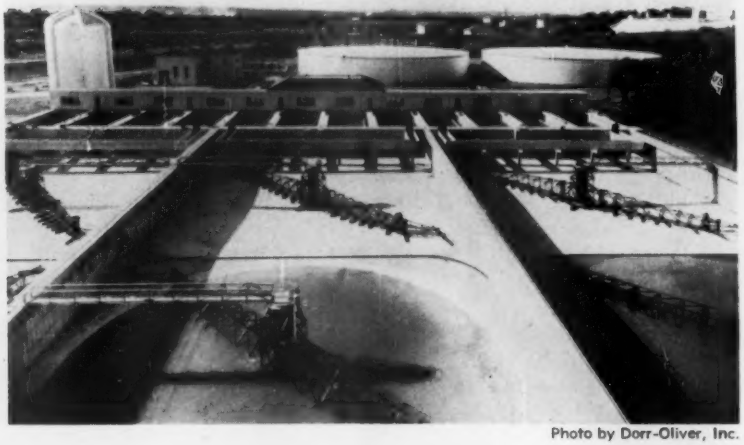


Photo by Dorr-Oliver, Inc.

MILLION GALLON radial cone bottom elevated tank for Montgomery, Ala.

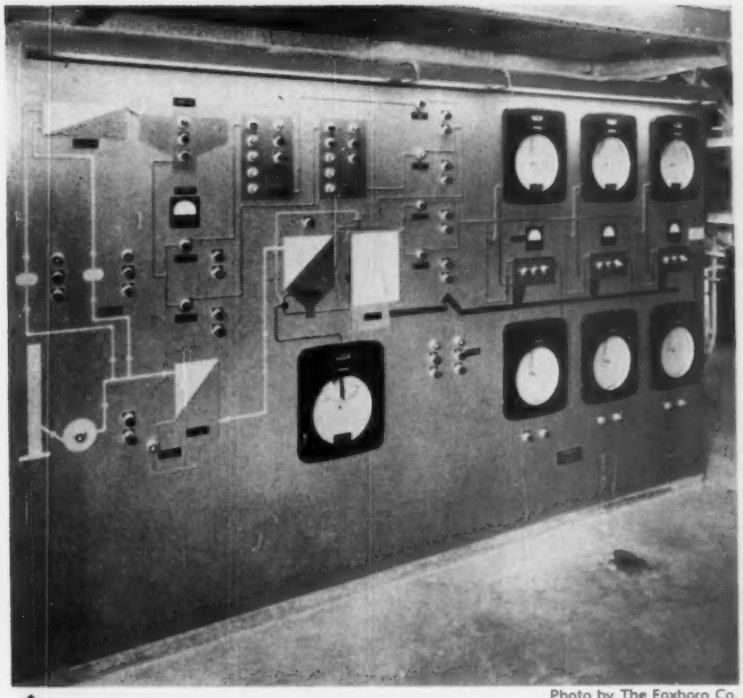


Photo by The Foxboro Co.

GRAPHIC PANEL centralizes operating controls for Dayton's lime recalcination plant.

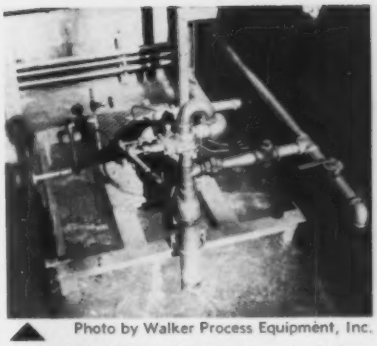


Photo by Walker Process Equipment, Inc.

CARBONATION of water supply, Western Springs, Ill. utilizes Walker Carball unit and Sparjer diffusion system.

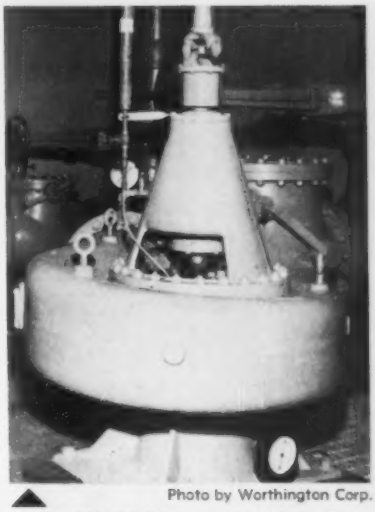


Photo by Worthington Corp.

MAIN PUMPING room in New Elizabeth, N. J. pumping station features 20-in. mixflo pump.

MICROSTRAINERS REDUCE plankton and suspended solids at Belleville, Ontario, Canada.

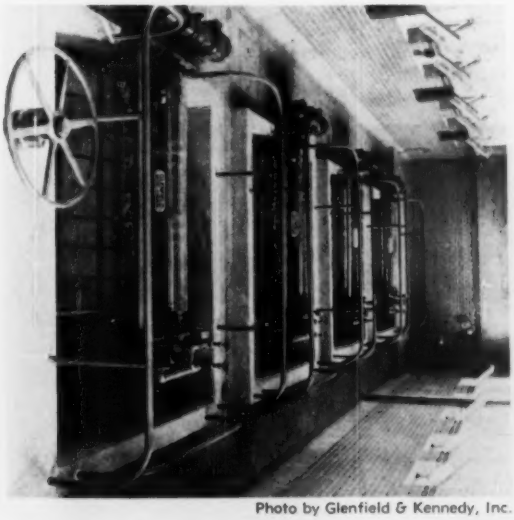


Photo by Glenfield & Kennedy, Inc.

Photo by Hagan Chemicals & Controls, Inc.

AUTOMATION will take over Philadelphia's Water Works when this fully integrated electronic load control system goes into operation in April.

Photo by Mueller Co.

DRILLING MACHINE by Mueller makes cuts from 2 through 12-in. pipe and insert valves up to 8-in. under 250 psi.

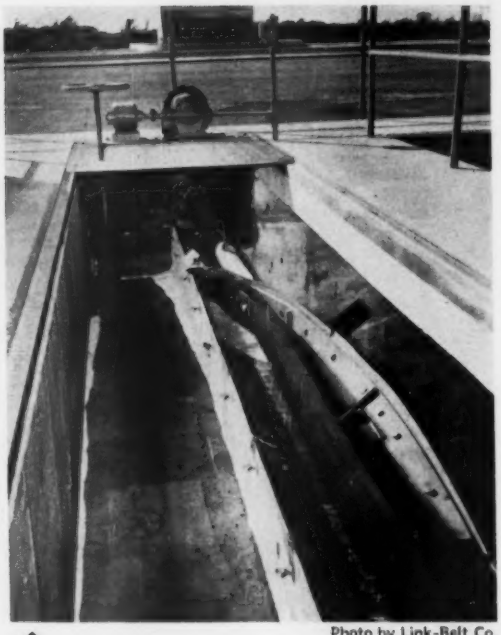


Photo by Link-Belt Co.

SPIRAL BLADE scum skimmer has synthetic rubber blade squeegee. One of 12 units at Miami, Fla. sewage treatment plant.

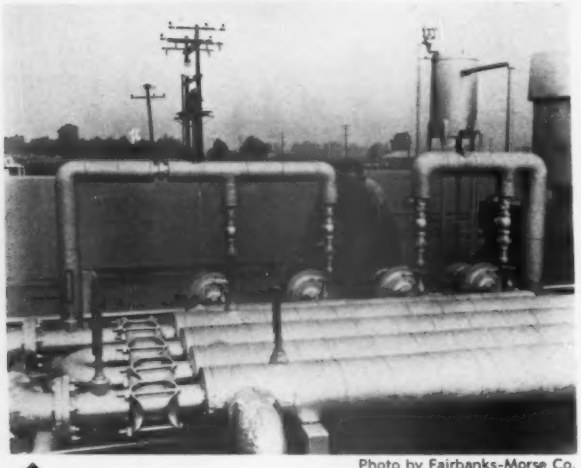


Photo by Fairbanks-Morse Co.

BUILTOGETHER pumps on heat exchange system for cooling and sludge heating.

REMOVABLE plate diffuser equipment used at Kewanee, Ill., part of P.F.T. Dual Aeration System.

Photo by Pacific Flush Tank Co.

Photo by Keasbey & Mattison Co.

ONE - PIECE Asbestos - cement "Tee" socketed fitting hastens pipe laying.

Photo by Dorr-Oliver, Inc.

THE "NEW LOOK" in sewage treatment units for heavily populated areas, is provided by Dorr-Oliver's CompleTreator.® Unit is located in Westchester County, N. Y., and has an average daily capacity of 15,000 gal.

TRUCK - LODER Bucket Machine eliminates hand shoveling, as sewer deposits are dumped directly into the truck.

Photo by Flexible Inc.

FLOTATION-CLARIFIERS provide pressure flotation and sedimentation for domestic and industrial sewage at U.S.A.F. Base, Palmdale, Calif.

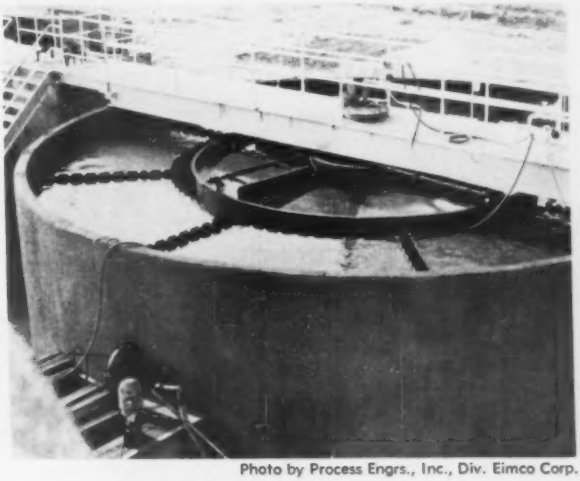


Photo by Process Engrs., Inc., Div. Eimco Corp.

Photo by O'Brien Mfg. Corp.

HEAVY DUTY SEWERKING handles up to 500 ft of steel cable for manhole to manhole cleaning.

ROTARY POSITIVE blowers provide air for primary aeration plant at Miami, Fla. Blowers are driven by dual-fuel engines.

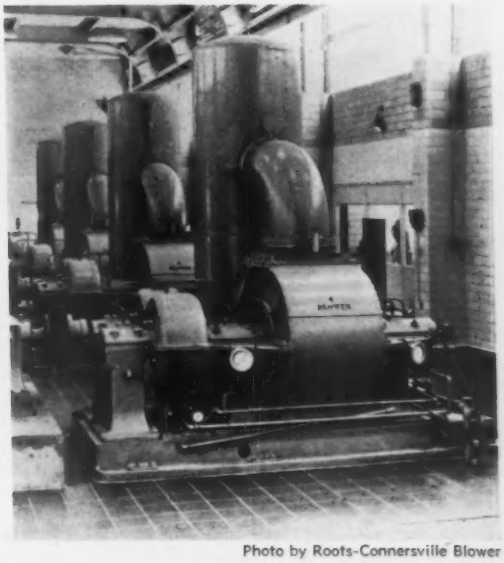


Photo by Roots-Connersville Blower

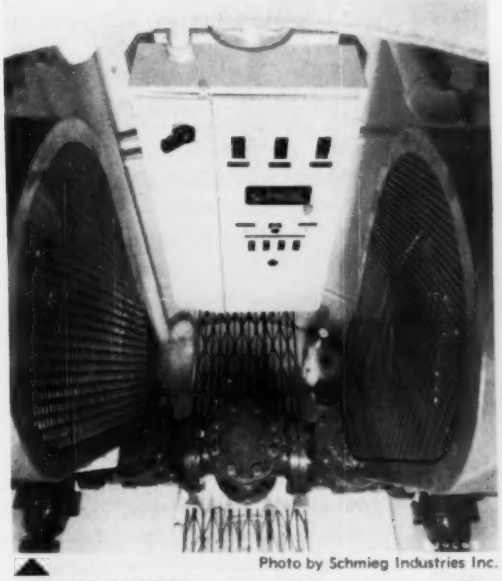


Photo by Schmieg Industries Inc.

SEWAGE EJECTOR station. Wide angle photo illustrates full interior of this 100 gpm unit.

Corpus Christi eliminates acres of drying beds and miles of outfall sewers by installing a . . .

Rotary Sludge Drying System

Photo courtesy Standard Steel Corp.

NEW BUILDING houses the Standard-Hersey rotary dryer, incinerator and other parts of the system, and makes obsolete the drying beds in the foreground.

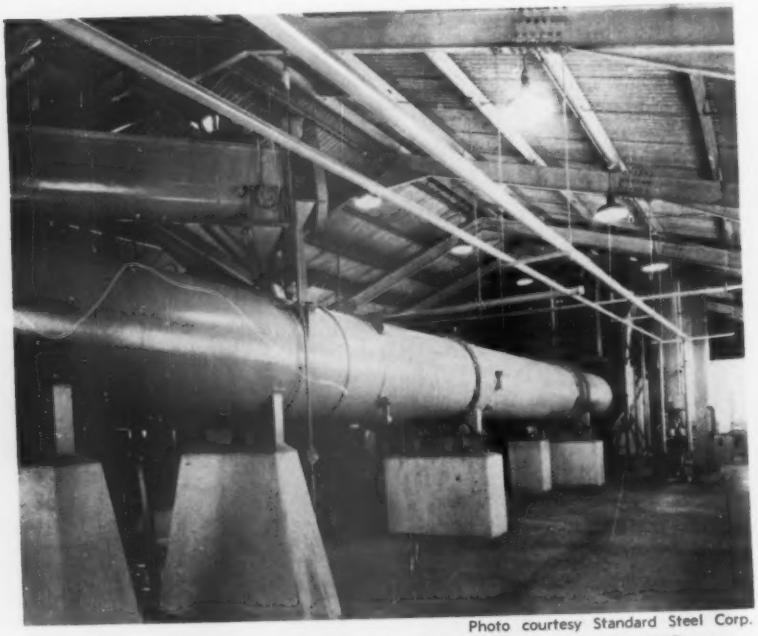


Photo courtesy Standard Steel Corp.

STANDARD STEEL rotary sludge dryer at Broadway sewage plant, Corpus Christi. Pugmill (upper left) mixes the raw feed with the recycled dry product prior to entering rotary dryer.

■ THE CITY OF CORPUS CHRISTI, TEXAS, has recently installed two new sewage treatment plants that are equipped with rotary dryers for the drying of both digested and raw sewages.

In operation, the dewatered sludge from the filters is mixed with previously dried sludge before feeding to the rotary shell. This material is then fed across the entire cross-section of the rotary shell by lifters which shower the sludge through the hot gas stream, thereby gaining the maximum of heat transfer in a minimum volume, while at the same time handling the material so as to minimize dusting.

To protect the sludge from excessive heating and fires, the flue gases produced by burning fuel with air are mixed with excess air and the resulting gas mixture passes into the rotating shell at the same end as the wet sludge. Thus, the hottest gases meet the wettest material, and the material is protected from overheating by its own water content. As the sludge and the gases travel down the shell length, the gases become progressively cooler and the sludge progressively drier until, at the discharge end, the dried material is in contact with a gas which is not only rather low in temperature, but is made up of a good deal of fire-inhibiting water vapor.

The dried sludge produced by this system is granular and non-dusty, and the operation renders the off-gases odorless by raising them to a minimum temperature of 1200° F.

Corpus Christi has found that the rotary sludge drying system provides the following advantages: Low initial cost; Compactness; Low fuel cost; Fully automatic on-stream operation; Low labor costs; and, All-weather operation.

One operator and two men, can load or unload 80 lengths of 24-in. pipe in 15 minutes with the use of this . . .

Special Tractor Fork Attachment

■ THE MANAGEMENT of the Concrete-Pipe Corp., Dedham, Mass., in the interests of developing a more efficient materials handling system, has designed a set of special forks that can be attached to the arms of a Trojan tractor shovel.

The idea was to utilize the natural tilt action of the Trojan's operating arms and stand the pipe on end in the trailer of a truck. This would allow the truck to carry more of a pipe load, thus increasing the footage moved while decreasing the number of trips required to do it.

The tilt angle of the Trojan's operating arms make it possible for the pipe to be placed upright on the truck without any breakage or chipping. This is due to the curvature of the machine's operating arms, which are almost parallel the ground at the bottom, and due to the fact that there is a piston on each arm. Furthermore, the reverse curve safety arms of the Trojan unit give the operator full 360° vision at all times. Full visibility eliminates the danger of damaging the pipe since he can see where to place the forks in lifting the pipe, and also in lowering it on to the truck bed, or the ground.

The Trojan tractor shovel-fork unit requires only the operator and a two-man crew, who position the pipe on the truck, or ground, thus effecting a considerable saving in labor costs.

The Trojan-fork units handle 4-foot pipe sections from 12 to 54 in. in diameter. A typical load of 12-in. pipe—320 ft or 80 lengths—can be loaded in 15 minutes. Two of the 54 in. sections, weighing 2.5 tons each, can be lifted, moved and placed at one time.

THREE 4-FOOT SECTIONS of 24 in. pipe being lowered into position. This 3600 lbs of pipe is handled by the special fork attachment for the tractor shovel.

THE TILT ACTION of the operating arms permits the forks to place the pipe sections on end and in the truck.

Photo by Hammarlund Mfg. Co.

INSTRUMENTATION, as applied at Suburban Water Co., La Puente, Calif. is the forerunner of automation, which can be foreseen when one looks at the recent past for clues to . . .

Future Developments *in Water and Sewage*

by GEORGE E. SYMONS, Ph.D.
Editor, WATER & SEWAGE WORKS

AUTHOR'S NOTE: At the Joint meeting of the Florida Section of AWWA and the Florida Sewage & Industrial Wastes Assn. held in October, I had the privilege of speaking on the subject of recent developments in the field of water and sewage. For that talk, I chose to look at both sides of the present and, without entering into too much detail, reviewed some of the recent developments in water supply and wastewater disposal. Some developments had to be omitted here with due regard to the dictates of space; several comments were made on a number of developments which may well be recent in 10 or 20 years from now. These latter may be more important than the former.

Both the Amer. Water Works Assn. and the Federation of Sewage & Industrial Wastes Assn. graciously released the paper for publication here.

■ THERE ARE so many factors common to both water supply and sewage disposal that it appears desirable to present this discussion of these two phases of the field in one article. In the interest of serving each phase, however, these comments are grouped under the headings of water supply and sewage disposal, and general comment applicable to both phases of the subject.

Water Supply

Four to five decades ago, most of our water was obtained from surface supplies and there was ample water both above and below ground for all

Photo by Dorr-Oliver, Inc.

CHEMICAL PRECIPITATION is employed at the Middlesex County Sewerage Authority at Sayersville, N. J. where a combination of domestic sewage and industrial wastes is treated.

the needs of our population. Today, there is just as much water as there ever was or ever will be, but our water needs are growing at a steady pace. It has been calculated that each year we need water facilities built to supply an additional 600 mgd. This calculation is based on the present rate of population growth and the present rate at which our daily per capita demand is incerasing. Although the total amount of water is constant, its availability in areas where it is needed varies greatly. In many localities, surface supplies within reach are no longer sufficient in their yield for the needs of the community. In many places too, the ground water table is being lowered at an alarming rate because of the practice of "mining" water.

To offset this growing demand for safe, palatable, and acceptable water for both municipal and industrial uses, we are now employing five practices—(1) building transmission mains to sources of supply at greater and greater distances; (2) building impounding reservoirs of greater and greater size; (3) cleaning up our rivers to make them more suitable as raw water supplies; (4) recharging our ground water aquifers and (5) demineralizing saline water.

As yet, ground water recharge has been principally from surface supplies, but, experiments have been made and are continuing on the use of treated sewage for ground water recharge.

Saline water conversion, as a method of increasing water supply is now under intensive research under the auspices of the office of Saline Water. Several methods are being studied, including distillation, membrane dialysis, solar evaporation, and freezing. As yet, the cost of salt water conversion is quite high compared to other treatments, but the conversion of brackish water, of which there is much in this country, does offer a feasible source of supply in the near future. Even today, where fresh water is in very short supply, conversion of

Photo by Great Lakes Carbon Corp.

DIATOMITE filtration is used as 1 mgd water plant in Montecito, Calif. Operation is semi-automatic for two 600 sq ft filters housed in a residential type building 20 x 40 ft.

sea water is economically feasible, and there are distillation plants now in use at Kuwait on the Persian Gulf, Aruba, Bermuda and in California. Also a new membrane conversion plant is being installed at Coalinga, Calif.

I believe that one can confidently predict that (1) saline water conversion will become inexpensive enough to make it practical, (2) that sewage treatment will be a more important part of the whole picture of water resources, and (3) that sewage treatment process will be such that the effluent can be safely discharged into the ground to maintain the ground water level for use as municipal and industrial supplies. This means waste water reclamation in the highest degree.

Water Treatment

Within a water treatment plant itself, we have already seen a trend toward tailoring water, not only to make it merely palatable, and safe, but also to make the product fit the needs of both the householder and industry. In spite of the tremendous effect which syndets have had on the use of water and soap in the home, we can look forward to a continued demand for tailoring of water by softening as well as adjustment of pH and alkalinity, iron and manganese removal and control of tastes and odors.

These tailoring processes will continue to employ chemical treatments now in use, and perhaps some not yet thought of. Although fluoridation is not water treatment per se, it is a form of tailoring. I expect that its use may decline in the future, not because of any ethical, medical or emotional prejudices of today but because less expensive ways will be found to supply this trace element to people needing it.

In the area of *coagulation,* we have seen a recent trend toward the use of coagulant aids, substances, which when added to water in small amounts increase the ability of the coagulant to form larger and heavier flocs and thereby improve coagulation and sedimentation. One of the first of these substances was activated silica. Although it was introduced more than 20 years ago, its development and real application had to await the development of equipment which could produce it in a continuous process, rather than in a batch process. Such equipment is now available and its use in the future will continue to grow.

A more recent development in this field of coagulant aids is the polyelectrolite of which there are many. These substances are now under intensive study, both as to their effectiveness as a coagulant aid and as to their effect on the safety of the water into which they are introduced. It is interesting to note that workers at the University of Florida have been identified with the investigation of both activated silica and polyelectrolites.

One cannot overlook a recent trend to liquid alum as a coagulant; changes in the chemical industry in the future may further effect this trend and coagulant usage. As to the use of ultrasonic vibrations for coagulating colloids, or for disinfection, power costs would seem to preclude commercial development of this technique.

In the area of *sedimentation,* the use of upflow clarifiers has developed to a considerable extent in the past several years. We have not yet seen the ultimate in the design of clarifiers or sedimentation basins, and undoubtedly some of the future development of this equipment will be related to the use of coagulant aids and the improvement of the coagulation process.

Filtration

There has been a trend toward higher filtration rates in rapid sand filters, and it seems quite likely that higher rates will be accepted as common practice in the future; particularly, as preparation of the water in the coagulation and sedimentation processes improves the applied water.

Diatomite filtration, using a body feed of diatomaceous earth which is caught on a filter septum, has found some application in municipal supplies since its development in World War II. One of the objections to this type of treatment has been that it operated as a pressure filter system. Within the past few years this objection has been met with the development of a vacuum type diatomite filter, which is open for observation at all times. Principal applications so far have been at swimming pools, but the device has possibilities in municipal water treatment as well, particularly in smaller supplies where coagulation is not necessary but where filtration of some sort is essential.

A more recent development of the diatomite filter is reverse diatomite filtration, where a thin membrane is used to hold the diatomaceous earth,

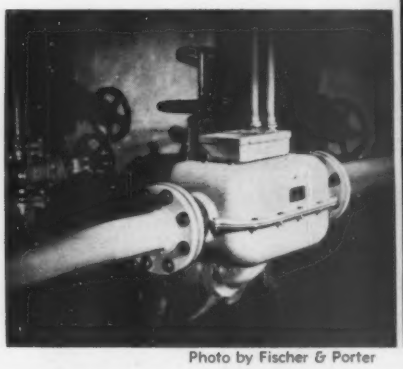


Photo by Fischer & Porter

NEW FLOW SENSING element employs magnetic principle; it offers unobstructed passage to the fluid flow.

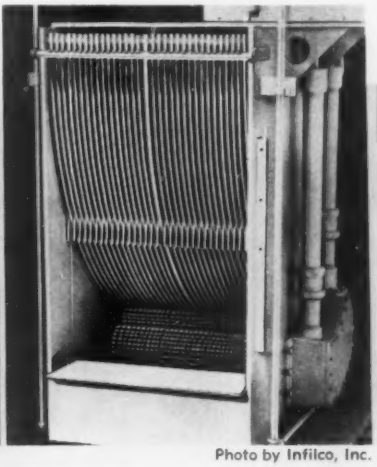


Photo by Infilco, Inc.

COMMINUTOR and screen employs rollers as the comminuting element and incorporates safety drives.

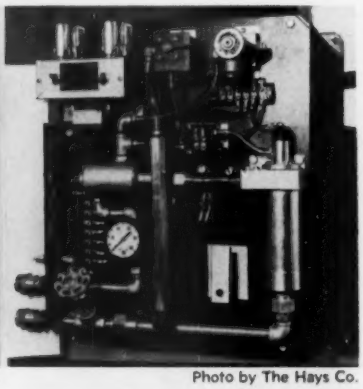


Photo by The Hays Co.

DISSOLVED OXYGEN meter (as seen from the rear) for analysis of effluents from wastewater plants.

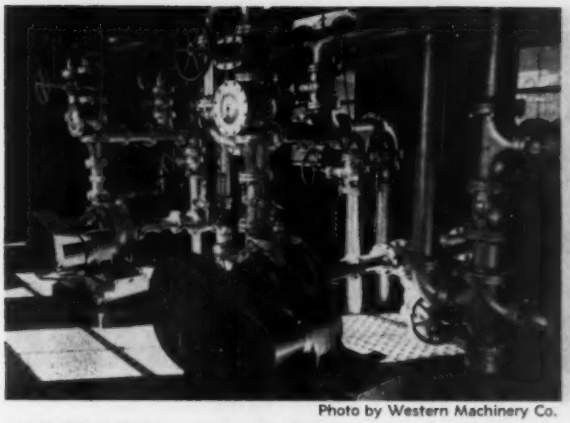


Photo by Western Machinery Co.

TORQUE-FLOW pumps at Clark County Sewage Treatment Plant in Las Vegas, Nev. pump 300 gpm of digested sludge against 45 ft TDH.

Photo by Naugatuck Chem. Div.

RUBBER AND PLASTIC blend is used in this pipe for carrying corrosive chemicals at Dallas, Tex. Elm Fork Purification Plant (Shiny-surface pipe, bottom center, is Kralastic.)

and the flow through that membrane is reversed at intervals to wash off the cake and provide a new filtering surface. This system is described in an article in the November 1958 issue of WATER & SEWAGE WORKS magazine. One possible, and probable, application of diatomite filtration will be to provide for peak flow demands at low capital investment costs.

Another new development in the area of filtration is that of microstraining, a process whereby water is passed through a monel metal woven wire cloth with openings of 23 microns for the finest weave. This device, which can be installed at lower costs than sand filters, is capable of removing algae and other foreign matter larger than 23 microns in the finest screen. It operates at a low head loss and a wash water consumption of 2 to 3 per cent. To date the apparatus, which is a revolving drum, has been used mostly in England, but there have been some recent installations in the United States and Canada and several pilot plants are now in operation in this country.

In the area of *disinfection*, there is nothing on the horizon, at the moment, to challenge chlorination, unless one considers the possibility of nuclear radiation. Radiation of some form is not an impossibility and may well come in for intensive study in the future. Recalling some of the difficulties inherent in the treatment of water with ultraviolet radiation, one may suspect that new techniques will have to be sought if water is to be radiated for disinfection purposes.

Within the past two years, a survey of water plants having *tastes and odors problems* has indicated that activated carbon is still the principal substance used for the removal of tastes and odors; most other treatments are limited in their effect. A good many years ago, the use of ammonia and chlorine as a combined treatment was in vogue for the handling of taste and odor problems; then came free residual chlorination; now it seems there is some consideration again being given to ammonia-chlorine treatment to eliminate chlorinous odors in water after treatment.

In the area of water distribution systems, there appears to be little likelihood that cast iron, steel, concrete and asbestos cement pipe will be replaced by something new or radically different. On the other hand, the development of plastic pipe for house services and small lines may replace copper, and plastic lining material may one day be used in metal mains and perhaps even in concrete. Whether or not new materials for lining pipes in place are developed, it is certain that more and more linings in place will be made, even in the smaller pipes. Valves and valve operation will improve in the coming years but no radical new concept of valving appears on the horizon at this time.

Sewage Disposal

One of the most important aspects of sewage treatment today has been the introduction of syndets to the buying public. Whether or not one believes that syndets cause foaming or other problems in sewage plants, the fact is that the use of the synethic detergents has probably had the greatest impact on sewage treatment of any development in the past century. This is true, principally because the composition of sewage has changed since syndets were introduced. This composition may change again if nonionic syndets are substituted for the anionic substances of today. Recent studies have been made on a variety of effects of syndets besides the change in composition of the sewage. These studies include the effect on bacteria and their ability to degrade the syndets, foaming under various circumstances, effect of phosphate builders, etc. Although syndets in sewage are eliciting the most interest today, the possible effect of syndets on water treatment may be something to watch with interest in the future, particularly in the area of ground water pollution and water coagulation.

Primary Treatment

Efforts to increase the removal of suspended matter will continue to be made and combinations of sedimentation and flotation which have found use in recent years will be explored for further application. The greater the removal of organic matter in the primary plant, the less the load on the secondary plant and consequently the greater the possibility of purifying the waste water. Chemical treatment may emerge from disfavor in the municipal field and be used in conjunction with other treatment. The microstrainer device may find use as a

Photo by Graver Water Cond. Co.

UPFLOW clarifier of concrete constructed below ground level in a Northern Ohio municipal water treatment plant.

Photo by Chain Belt Co.

INCREASED CAPACITY is a must for the future and this circular settling tank at Sioux Falls, So. Dak. had its capacity doubled by changing the overflow weir system.

means of reducing the load on a secondary plant; it has also been used to remove solids from the effluent of trickling filters and the activated sludge process.

Secondary Treatment

In the area of secondary treatment, the concept of total oxidation has received considerable study of late and has been shown to be applicable to both municipal and industrial wastes. This method of treatment has been variously called total oxidation, total mixing, and the Hi-Lo process depending on the investigator, but all have the common characteristic that there is no sludge from the process, it is all oxidized. This factor alone makes the process of interest, for the matter of sludge disposal has long been one of disagreeable necessity.

Sludge Disposal

Until such time as waste treatment processes eliminate all solids disposal problems, we shall continue to need development in this area. Sludge digestion under anaerobic conditions will not be outmoded for some time and we may yet see the day when raw sludge will be sterilized and inoculated with some form of bacteria that will produce desirable chemical products other than methane gas. New concepts of digester design already exist in Germany and may find use in America.

In water works, today, we produce a manufactured product, namely, water, tomorrow we may turn a wastewater treatment plant into a chemical factory to produce substances important to our economy as well as to reclaim water.

As long as sludge digestion remains an integral part of waste treatment processes, there remains the problem of handling and disposing the residual sludge. Current efforts employ conditioning, vacuum filtration, and drying or incineration. Developments in drying and incineration have been progressing in recent years with the advent of new design and rotary dryers; competition also has become rather keen in the matter of vacuum filtration, with new types of synthetic filter cloths, and new types of filters and dewatering equipment. Centrifuging which was tried 20 years ago, or more, is again under consideration and may become a highly competitive treatment.

Two other processes for sludge handling and disposal are currently under investigation. Both propose to eliminate digestion, drying, and disposal problems while at the same time producing a useful product, namely steam.

In one of these methods, the atomized suspension technique, sludge is sprayed into the top of a reaction tower, where, by virtue of the sludge calorie content, a wet combustion of the organic matter present is accomplished as the spray falls through the tower. The reaction is kept at 1400°F at pressures of about 40 psi created by air forced into the bottom of the tower. The heat created by the wet burning not only evaporates the water but produces steam which can be reclaimed for its heat value.

In the other method, the Zimmerman process, wet sludge is forced into the bottom of a reaction chamber and passes upwards around baffles. Wet combustion oxidizes the organic matter and the heat produced converts the water to steam which can be used. This process operates at 500°F and at a pressure of 1200 psi. It requires all stainless steel equipment and high pressure pumps and compressors.

Both processes require that the sludge have a minimum solids content of about 3 per cent to be thermally self sustaining and about 6 to 8 per cent solids to produce usable heat for power. Both processes produce a very fine powdery ash, which must be disposed of.

At the present time the Zimmermann process is under consideration in Chicago at the Southwest plant where it is estimated that the cost of a plant to handle the increased load by this method will be about one fourth the cost of a conventional dewatering and drying systems for the same load. It will be of interest to watch both of these developments.

General Comments

There is one area of water and sewage treatment which will see a considerable growth in the future; that is the matter of automatic control of treatment processes and plants, or automation. For many years we have had automatic or semi-automatic control of pumps, flow, and filters (even automatic back washing of rapid sand filters) and distribution systems through special sensing devices and controls.

The control of chemical treatment processes, however, has not been really possible, except by relation to flow. There have been no sensing elements available to fit into the chemical process to control that process by the demand for the chemical or by the chemical reaction itself. Work is being done, however, on one such device to determine conductivity as it relates to the coagulation reaction and fluoridation control has been related to conductivity.

Within recent years we have seen new developments in the sensing element for flow measurement. There is little doubt that sensing elements will be developed in the future for all water and sewage treatment processes. Automation of chemical treatment processes will become a reality to be fitted into the already possible automated physical plant. Closed circuit television may also find application.

Laboratory Control

In both the water and sewage works laboratory, we can expect to see more and more use of instrumental methods of analysis, and I think, full acceptance of the membrane filter technique for the determination of bacteria. Whether or not we shall ever have a better indicator organism than the coliform group, I do not know, but I am sure that we shall soon have methods of determining bacteria in relatively short times and we may find the use of the electron microscope a common practice in this regard; it is already being used in the Chicago Water Department.

Several of us on the staff of the Illinois State Water Survey in the late 20's envisioned the ideal analytical apparatus into which we could pour a sample of water or sewage, push a button and have the typewritten analysis come out the other end. Twenty-five years ago that idea was strictly "Rube Goldberg," but recently Mr. Ed. Cleary of the Ohio River Water Sanitation Commission suggested robot monitoring of streams and who knows, if we can develop the sensing instruments, we may see automatic analysis an essential part of the operation of a waste treatment plant.

With no strain on the imagination, one can foresee that the waste water treatment plant of today will become a factory in which it will turn out a water which can be used directly as a source of water supply, or if not directly, certainly after recharge to the ground or to a stream; in short the sewage plant effluent will have the same chemical and bacteriological characteristics as the raw water supply of the community. Obviously, that means more than primary, secondary and disinfection treatment; it might even mean some form of deionization. What part nuclear energy will play in this treatment plant of the future, is not apparent at the moment, but one may expect it to be important.

It is interesting to report a trend toward better architecture in our water works and sewage plants. Today's water works and sewage plants are becoming attractive structures and we may look for a continued trend in that direction as designing engineers let their imagination work and give up some hide bound attitudes of the past.

Management

One can not leave this subject without referring to the present laudable efforts of the American Water Works Assn. and the Federation of Sewage and Industrial Waste Assns. for their programs to improve management and advance personnel. While we have come a long way from the 84 hours a week our fathers worked in a water plant, one may be sure that there will be further improvement in the working conditions of the men in this field of water supply and waste water disposal.

Just as surely there must be an increase in the number of trained engineers needed and used in this field. To date, we have been losing ground steadily in our efforts to draw young men into the profession, but with the current emphasis on public relations and the elevation of the profession, we may expect to attract the young trained men we need, but—and this is important—we shall have to offer these men a financial compensation that will compete with other technical industries.

Nuclear physics and space exploration may be the most exciting and important factors in the future of our world, but we in this field must not let ourselves forget that we are the largest industry in existence and that without water supply and sewage disposal, modern living and even life itself is impossible. In the next quarter century, the importance of our industry and its personnel will be better known and command greater respect than it does today.

New Texas Water Plant

The $5,621,000 South Holly Water Plant at Fort Worth, Texas has a normal treating capacity of 50 mgd and a pumping capacity of 135 mgd. Together with the old North Holly Plant, the city water system now has a rated capacity of 129 mgd. The new plant is designed to permit an ultimate development of the entire Holly Plant Site to an overload capacity of 250 mgd.

Components of the new plant include a 72-inch raw water conduit from the West Fork of the Trinity River, chlorine building, chemical headhouse, three sedimentation basins

with continuous sludge removing facilities, 12 open filters, an administartion building including filter center and laboratory, two 6 mil gal clear wells and a high service pump station and appurtenances.

Control of the entire water system will eventually be possible from the water dispatch room of the high service building. Instruments will indicate supply, demand, pressures and storage. All booster pumping stations may also be operated by remote control from this central station.

An artist's rendition of Fort Worth's new South Holly Water Plant is shown. The picture shows the two clear wells, high service pump building, wash water tank, administration, filter and laboratory building, filter tanks, sedimentation basins, chemical building and chlorine building to the left of the chemical building.

Detroit Meeting also had papers or panels on . . .

Toxicity, Maintenance, Reclamation, *and* *Industry-Municipality Cooperation*

A report by
JAY S. GRUMBLING and F. C. MAURER
Associate Editors

EDITOR'S NOTE: In the December, 1958 number, *Water & Sewage Works* carried the first two installments of the report on the annual meeting of the FSIWA held in Detroit, Mich. Included in that issue were reports on activities of the Federation, administration, cost reduction and syndets. This installment includes reports on panel discussions of toxicity, sewer maintenance, plant maintenance, as well as industry-municipality cooperation and the reclamation of sewage plant effluents.

TOXICITY was the topic at the Laboratory Scientists Breakfast, where Dr. G. P. Edwards of N. Y. Univ. and Dr. R. S. Ingols of Ga. Inst. Tech. participated.

■ TOXICITY DETERMINATIONS, Laboratory Scientists' Breakfast; Gail P. Edwards, presiding; R. S. Ingols and C. M. Tarzwell.

The breakfast session supported open discussion on laboratory toxicity determinations which centered generally on the shortcomings of various tests defined in *Standard Methods*.

It was noted that all phenols are lumped together in one broad classification and considered as a group rather than singularly.

Those inert organics demonstrated as the possible cause of the wide difference in BOD and COD values of a given waste, are they toxic or merely bypassed by the micro-organism?

Since bioassay is the practical approach in evaluating toxicity, the subject easily becomes a topic for discussion. The laboratory should endeavor to reproduce those conditions existing in the stream which is to receive the waste under study. To determine median tolerance limits (TLM) it must first be determined if the time for effect or the time for kill is the controlling factor. Can the fish swim against current without further effect? Fish are the reagents in bioassay studies. If fish die in the control, the reagent is no good and the results are of no value. Uniform healthy fish must be tested in various dilutions of the waste being evaluated. It is suggested that ten dilutions, increased from the weaker logarithmically to the stronger, be used so results may be correlated as straight line functions when plotted graphically.

Sewage Works Panels

■ SEWER MAINTENANCE PANEL, Sydney A. Preen, Leader; Grant M. Olewiler, M. B. Nixon and John L. Klamm.

Engineering drawings can be the answer to some of the biggest problems facing a sewer maintenance department. The more detailed, up-to-date, and accurate the drawings are—the easier the maintenance job. Each separate locality should have maps or plans of its complete drainage area. Additional help is provided by having an accurate road map that shows the actual physical location of the sewers and the direction of flows. This map should actually show the location of the pipe line, either in the middle of the street, at the side, and even when it cuts across parkways instead of following the center of the street. Some of these drawings should also show the physical location of manholes and provide information about the sizes of pipe at each location and the gradient.

Provision should also be made for a complete building inspection at least every ten years to check on illegal plumbing and when found, to make adjustments on the sewer service bills.

The value and importance of establishing and maintaining accurate, up-to-date records on the complete system cannot be over-emphasized.

Public relations and safety should be two prime considerations in the operation of any sewer department. The work foreman, or one of his men, is usually the only contact the citizen ever has with the sewer department, thus it is the tendency of the citizen to judge the entire sewer department by the actions of that individual with whom he has had personal contact.

All foremen of the utility should be instructed in public relations and all workers should be instructed to, at least, be courteous.

Publicity should be used to the widest extent possible to keep the public informed of the various department activities. Publicity is effective

in reducing complaints about streets being torn up, for instance, but an informed public is a cooperative public.

Another point that should never be overlooked by the sewer department is the safety and protection of the public from any dangers that might be present due to sewer construction or repair work.

It is recommended that public relations be a basic course in any in-service training program.

■ PLANT MAINTENANCE PANEL, John C. Sager, Leader; Fred H. Burley and Clifford E. Irving.

The Minneapolis-St. Paul Sanitary District was having trouble with clogged sludge lines. After many experiments with different types of equipment, the district finally decided on Flex-O-Scrapers to clean lines. Catch basins and sludge buckets were set up at various points throughout the sludge line network to catch the scrapers. Since the adoption of this method, the sludge lines are now cleaned with little mess and few man-hours.

Synthetic detergents being used today also seem to cause grease build-up in the sludge lines to cause plugging. The introduction of warm supernatant from the digesters into the sludge lines helps to clean sludge lines. In this respect it was brought out that Boston, Mass., after trying many different methods of cleaning sludge lines, finally solved the problem by using a large heat exchanger and now pumps effluent into the sludge lines at temperatures of from 160 to 170°F. This clears the lines and keeps the pumps very clean. During the discussion, the question was asked if warm water would serve the same purpose as warm supernatant? The reply was yes, the only difference would be in the quantity of water needed.

In the discussion of spare units and parts, it was pointed out that usually a large variety of stock is required at all times due to the fact that sometimes 3 or 4 weeks, or in some cases longer, are needed to get replacements. Equipment manufacturers should also list the stock numbers of the various component parts, and supply a list of the original manufacturer of the component parts.

It was suggested that hatch openings be provided near the bottom of digesters for the easy removal of grit.

The breaking up of hard scum on open digesters was successfully accomplished by the use of compressed air introduced at the bottom of the digester and supplied at a rate to cause a boil-up. The use of sodium hexametaphosphate was reported as unsuccessful in the breaking of scum.

In the maintaining of vacuum filter cloths, it was reported that of the new man-made materials now on the market, dacron has proven the most successful. Chicago has a dacron filter blanket that has been in use for over 27,000 hours and is still good. This is an outstanding record in view of the average 800 hour life for cotton or wool filter blankets.

MAINTENANCE problems were discussed in two panel sessions; among the participants were: John C. Sager, Minneapolis-St. Paul; Grant M. Olewiler, Ardmore, Pa.; M. B. Nixon, Atlanta, Ga.; Fred H. Burley, Detroit, Mich.; and Clifford E. Irving, Schenectady, N. Y.

Symposium on Industry—Municipality Cooperation

■ INDUSTRIAL AND MUNICIPAL COOPERATION FOR JOINT TREATMENT OF WASTES, S. T. Powell Consultant and James C. Lamb III, The American Cyanamid Co. and Roy H. Ritter, Consultant Somerset-Raritan Valley Sewage Authority.

The municipal and industrial wastes being discharged from the upper Raritan valley required treatment. A 1953 engineering report recommended that a single authority be established for the joint treatment of these wastes being discharged to the Raritan River.

The American Cyanamid plant at Bound Brook, N. J. had wastes from the manufacturing of rubber, chemicals, plastics, pharmaceuticals, pigments, several hundred dyes and large tonnages of "intermediate" chemicals. In addition the plant discharged cooling waters, sanitary sewage, and storm runoff from the plant area. The combination of these wastes was estimated to make up two-thirds of the organic and hydraulic loading of any joint venture.

Pilot plant studies of the industrial waste showed that modified versions of the trickling filter or activated sludge process would provide satisfactory treatment.

Studies also revealed that the BOD loading from Cyanamid would represent 82 per cent of the loading and

Table 1
Estimated Cost of Delivered Reclaimed Water at Amarillo, Tex.

Rate of Delivery [2]	Cost in Cents/1000 Gallons [1]				
	Reclaimed Water				Fresh
	Amortization [3]	Treatment	Transmission	Total	Water
1.5 mgd	8.08	5.54	3.60	17.22	18.00
3.0 mgd	4.04	5.54	2.72	12.30	18.00
4.5 mgd	2.69	5.54	2.75	10.98	18.00

[1] Based on 1956-57 budget year—annually.
[2] At increased rates of delivery pumping heads will increase to 380 ft at 3.0 mgd, and 460 ft at 4.5 mgd, but labor will remain essentially the same as for 1.5 mgd.
[3] Amortization payment is a constant amount, based on the availability of the entire 4.5 mgd treatment plant capacity for production of industrial water.

that the wastes were more difficult to treat than a representative volume of sanitary sewage. This waste of such large volume and uncertain character would not be welcome by a municipal plant unless generous allowances were granted and then it would be difficult since the chemical industry is subject to abrupt change of production items. For these and other reasons, the company felt that they would be at better advantage if they accepted the responsibility of treating their own wastes.

The company could handle the wastes by biological treatment processes either alone or in combination with domestic sewage. However, the plant waste was deficient in phosphorous which could be supplied by domestic sewage.

A local authority was therefore formed which intercepted the domestic sewage system of the community and provided primary treatment. Cyanamid constructed a treatment facility involving the activated sludge process and accepted the primary effluent from the municipal treatment plant. The cost of the joint venture has been established on an equitable basis and the arrangement has given both parties the maximum flexibility in their treatment operations.

■ THE AMARILLO SEWAGE PLANT EFFLUENT AS A SOURCE OF WATER SUPPLY FOR THE TEXAS CO. by Clarence H. Scherer, Supt. Sewage Treatment and Water Reclamation, Amarillo, Texas and Dean Alexander, Engineer, the Texas Co.

The city of Amarillo agreed by legal contract with the Texas Co. to: construct a 4.5 mgd sewage treatment plant for complete treatment, provide at least a three day storage of treated plant effluent, construct and maintain a pumping station and transmission line from plant to refinery, and provide any other units necessary for supplying a suitable industrial water. Further water conditioning is the responsibility of the refinery but through this municipal-industrial cooperation sewage plant effluent is used as cooling water.

INDUSTRY - MUNICIPALITY cooperation was discussed by James Lamb III of American Cyanamid and Roy R. Ritter, Cons. Engr., Baltimore.

Because the price the industry had to pay for reclaimed water was directly dependent on the cost of maintenance and operation of the reclamation plant, an elaborate system of accounting was established. Table 1 shows the comparison of costs to the company in using fresh or reclaimed water.

It was agreed that the delivered water must meet certain chemical and physical requirements. Table 2 illustrates the comparative analyses of city water, raw sewage, reclaimed effluent and the contract maximum limits.

The Texas Co. pretreats the reclaimed water before use as makeup water for the cooling systems. A cold process lime-alum treatment is used to remove phosphate and reduce silica. Phosphate removal is accomplished to eliminate the formation of tri-calcium phosphate sludge in hot equipment.

Boiler water is pretreated by hot lime and hot zeolite treatment. Calcium reduction is good and after further deaeration the treated water is very satisfactory for makeup water for 250 psig boilers. After three years operation, the boilers are in excellent condition.

Table 2

Comparative Analyses of City Water, Raw Sewage, Reclaimed Effluent, Compared with Water Sale Contract Maximum Limits, in Mg/l

Constituent	City Water	Raw Sewage	Reclaimed Effluent	Contract
Calcium (as $CaCO_3$)	97	108	104	..... *
Magnesium (as $CaCO_3$)	152	188	192	.....
Sodium	27	.....	110	.....
Iron	0.05	.....	0.3	.....
M. Alkalinity	255	359	310	.....
Hardness (as $CaCO_3$)	244	296	296	.....
Silicate	56	.....	79	.....
Ammonia Nitrogen	0	25	12	.....
Nitrate Nitrogen	1	0	5	.....
Phosphate	0	30	20	.....
Chloride	13	103	83	.....
Sulfate	34	.....	78	.....
Total Dissolved Solids	364	639	613	1,000
Suspended Solids	0	255	10	25
Biochemical Oxygen Demand	0	300	15	25
Chemical Oxygen Demand	0			.....
Chlorine Residual	0.2	0	0.6	0.1
pH		7.5	7.6	6.8—9.0

*Indicates either no analyses run or no maximum limits specified in contract.

Operators Forum

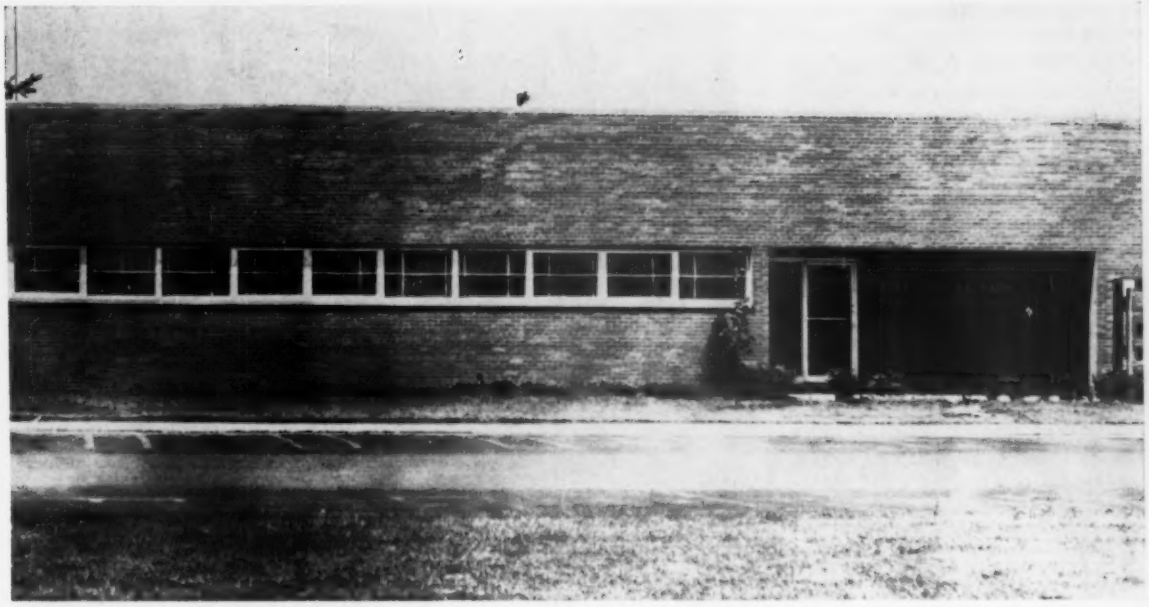
■ CONTROL OF DIGESTER SCUM, GAS RECIRCULATION AND MECHANICAL MIXING by D. P. Backmeyer, Leader; Hugh A. Schreiber, V. P. Enloe and W. A. Sperry.

The control of digester scum is accomplished by adequate mixing of digester contents either by gas recirculation or mechanical mixing. In some plants digesters have been built larger and larger but this merely results in smaller active volumes and impossible volumes of sludge to mix, especially mechanically.

Plants equipped with facilities for incineration have found it cheaper to draw scum off digesters to incinerators periodically to prevent it drying rather than going into expense of recirculation systems.

Gas advantages of from 33 to 52 per cent increases are reported in mixed digesters as compared to unmixed. The degree of increase depends upon loadings.

The trend appears to be toward smaller digesters with mixing and the concentration of sludge as thick as possible.



OAK PARK'S new Water Department Building, farsighted citizens, proper planning and metering are part of the story behind . . .

Meeting Water Needs, *in a fast growing community*

by JOSEPH B. THOMPSON, Superintendent, Water Supply System, Oak Park, Michigan

■ PROVIDING WATER for Oak Park, Michigan, a city which has had a six-fold increase in population in the past five years, is a task which has called for careful application of a variety of elements in modern water works practice.

Adequate planning for future expansion, detailed record keeping, initiation of a meter maintenance program and coordinated public relations efforts have all contributed to meeting the water needs of a city whose population went from 5,200 in 1951 to 36,000 in 1958. By 1970, it is expected to be between 40,000 and 50,000.

Oak Park, a predominately residential area north of Detroit, consists of 5½ square miles. Known nationally as "the City with a future," Oak Park's growth has not been spasmodic or haphazard.

Advance Planning

Thanks to the foresight of its citizens, Oak Park's growth has been an orderly development based on a master plan devised by professional planning experts and put into effect by trained city managers.

Anticipating a building boom, back in 1949 residents hired a professional planner to determine what areas of the city should ideally be residential, industrial and commercial, in order to have a well balanced community.

The over-all plan, under which the city operates, has brought Oak Park national recognition for its integrated police and fire system, its recreation program and its Civic Center plan worked out in cooperation with the Board of Education and the city.

Concern with future planning began in 1949 when the community changed from village status to a city utilizing the council-manager form of government. Elected mayors and councilmen have given full support to professional managers who have implemented the planned programs.

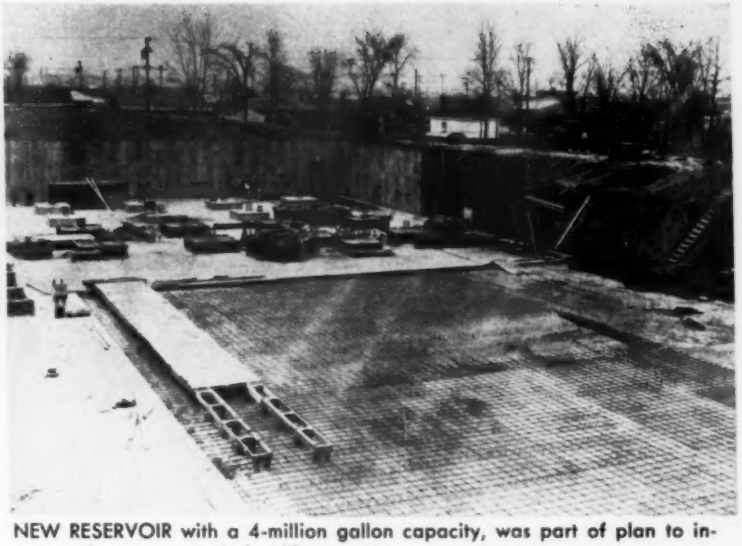
Specifically, the master plan separates industry from residential zones, reserving open land for wide greenbelts. It defines neighborhood school and park areas, provides ample parking facilities, and channels traffic for maximum safety. And it outlines areas for neighborhood shopping and central business.

With this pattern of planning going on in other areas of municipal service, planning for water service requirements was given wide community support.

System Operation Assumed by Oak Park

Until 1951, Oak Park's water system had been operated by the Detroit Water Board. In December of that year Oak Park was notified it was to assume full operation of its own water system in 30 days. With the building boom already under way, it was clear that major improvements and enlargements were vitally necessary.

During the years between 1951 and 1955, approval of $220,000 and $165,000 bond issues provided funds to improve facilities. During that period the department installed 30 miles of water mains constructed by special assessments, constructed a 24" transmission main of over a mile's length to increase capacity, built a 250,000 gallon tank to aid pressure in critical areas, constructed a pumping station to increase pressure during heavy peak load periods, and erected a Water Service Supply building to house the growing operation.

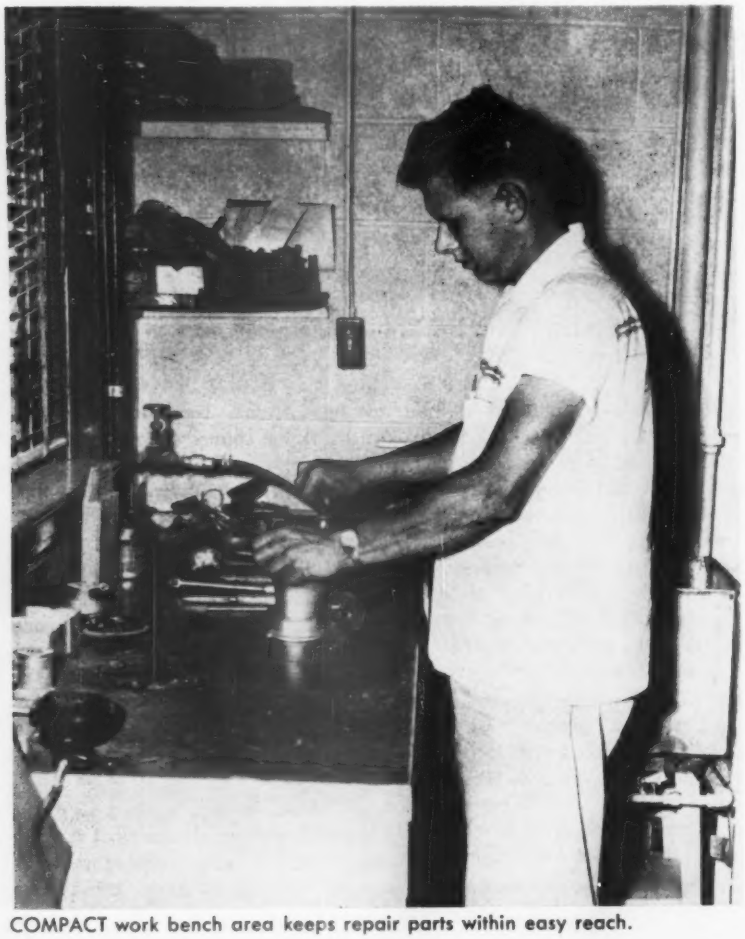


NEW RESERVOIR with a 4-million gallon capacity, was part of plan to increase the water supply by 50 percent.

Shortages Still Occurred

Despite these improvements, Oak Park continued to feel the effect of shortages during past summers. Contributing factors were the phenomenal growth of Oak Park and the inability of Detroit, which supplies water to many communities in the metropolitan area, to meet widespread demands. Year around average demand is 3.6 million gallons daily, but in summer this rises to 10 mgd.

To insure present and future demands, plans were completed in September, 1956, to execute a $550,000 revenue bond expansion program approved by city council after several months of study and research on the financial and engineering aspects. The program involved a 4-million gallon storage reservoir, two pumping stations and three miles of transmission lines to strengthen circulation, furnish relief during peak load periods and afford freer use of water during summer. In effect, the program is designed to increase the water supply 50 per cent and insure adequate pressure at all times in every section of the city. Work on this expansion program has now been completed.



COMPACT work bench area keeps repair parts within easy reach.

Plan Included Meter Program

Concurrent with its expansion program, Oak Park in 1953 initiated a meter maintenance program. Efficient utilization of available water supplies calls for elimination of wasteful practices. Meters which are not periodically tested and repaired do not provide accurate readings of actual water delivered, and deprive the system of earned revenue.

Oak Park's water meter repair

CLEAN, WELL-LIGHTED meter repair shop showing meters on test.

laboratory is located in the recently completed Water Supply building. It is equipped with a 6-unit Neptune meter repair bench. Here, meters are repaired and tested to meet flow rate performance standards recommended by the American Water Works Association.

Tests Show Need for Extensive Meter Repair Program

In Oak Park during the past three years 1100 meters have been pulled and tested. The city was divided into three districts and the meter survey was begun in the oldest sections of the city. Results showed that about 90 per cent of the meters recorded less than 80 per cent average accuracy over a wide range of flow rates. Significance of these figures is clouded by the fact that no records are available on the length of service of the old meters.

However, the fact that 150 of the 1100 meters tested had to be junked, and 90 per cent were less than 80 per cent accurate, strongly justifies the effort and cost involved in a meter maintenance program in terms of increased revenue.

Since meters are considered the cash registers of the water system, all service including municipal and other public users are metered. Residential and commercial meters are read quarterly and industrial meters once each month. There are no discounts in the rate structure, but there is a 5 per cent penalty for late payment.

Meter Dept. Personnel

Personnel in the department, in addition to the superintendent, consists of one meter shop stock man, two meter readers, one meter repair man, four service connection crewman, one foreman and seven persons in the office. This organization completes tapping of the transmission mains, bringing water to the property line, and then installs the meter after the plumber has completed the service line from the curb box to the house.

Water Dept. Keeps Public Informed

Two other elements of the operation which are important and receive considerable attention are the keeping of detailed records and attempting to keep the public informed.

Factual data provided by the records is essential for future planning, by supplying an accurate picture of past trends and current conditions which can then be taken into account in projecting anticipated needs.

Keeping the city manager, the mayor and councilmen informed through monthly reports and annual reports is a first step in maintaining public support for the water department's operations and goals. In addition, the water department is always represented in the city's annual report and the monthly bulletin, which are sent to all residents.

MOBILE meter test unit for testing meters in place. Both low and high flow rate meters are tested with this unit.

Being good and getting credit for it is a brief definition of "good" . . .

Public Relations *in water works operations*

by DOYLE J. SUAREZ, JR., Secretary and Personnel Director, Baton Rouge Water Works Co., Baton Rouge, La.

■ EVERY FIRM, every corporation, in fact, every individual, whether he wants to or not, has public relations. The question is, are those public relations good or bad. Actually when the term "public relations" is used, it has come to mean "good" public relations. What is good public relations? Good public relations may be defined most briefly as "being good and getting credit for it." That "being good" part is every bit as important, if not more so, than getting credit for being good.

Through a publicity campaign, advertising and other devices, it is possible to build up a reputation for being good even if you aren't. This type of good reputation, however, by the very nature of things, will be short-lived. More and more firms are learning that it is good business to be good, to operate in the public interest.

Utility Responsibility

Any public utility, whether municipally or privately owned, is charged with the responsibility of furnishing good and dependable service to the people of the community in which it operates. It should be the utility's aim, then, to perform this task and at the same time gain the good will of the customers served. If this can be accomplished, work will be more pleasant and more efficiently performed.

The utility, in fact any company, has a personality just as a person does. This personality is a complex thing that actually reflects the attitude, not only of the management group, but also of every individual connected with the company. In numerous person-to-person contacts made with customers, the person with whom the individual customer comes in contact actually is, in that customer's mind, the company. If the company then is to have good public relations, it must be made up of people who sincerely desire to do a good job and at the same time are interested in reducing or eliminating the problems which will arise in connection with the work. Good public relations will not exist if it is assumed to be the job of one man, one department or of a formal advertising program. It must be the responsibility of every employee to gain good will as he goes about his job and in any other contacts that he makes with the public.

The areas of contact with the public can be divided into two parts: indirect and direct contact:

Indirect Contact

Every utility has many interesting facts to tell the public. These facts may deal with the source of water supply, the quality, the cost or better still the value, some engineering feat or perhaps an expansion program which increases the service area. The utility may be in need of additional revenue in order to continue to furnish good service in its present and ever-expanding service area. To tell the facts to the public so that they can be better informed can only result in good. Without the facts on any subject, a person is left to assume exaggerated misinformation which is the product of an uninformed public. The company should certainly have some type of advertising program and should strive to maintain good relationship with the press since much that it has to tell is newsworthy. Through the use of advertising and good news coverage, the utility will benefit immensely. An informed public will be an understanding and appreciative public.

Some other opportunities for indirect contact might be educational tours of the plant which will be much in demand by the schools, Boy Scout and Girl Scout and other similar groups, or participation in Home and Sport Shows, or the like, by having an exhibit that will call attention to some interesting aspect of the operation of the company. Brochures containing information on water supply, quality, rates, rules and regulations, or other information of interest, should be made available to the people of the community.

Good, active citizenship on the part of the company and the people connected with it will certainly gain good will.

Direct Contact

The largest and most important area of public relations activity is that of direct or person-to-person contact. This is the part of public relations in which the continuing effort of every individual is absolutely necessary. It is very important that the company's office, grounds and equipment reflect good housekeeping practices. These things will contribute largely to the customer's first impression of the

"Good housekeeping contributes largely to the customer's first impression of the company."

"Every problem the customer has is close to him and therefore very important to him."

company. It will be assumed by many that an organization that cannot or will not properly maintain their property can hardly be expected to produce a quality product or render a quality service.

Since first impressions are so important, the customer should get prompt and considerate attention on his first contact with the company. This may be his visit to the office to apply for service or it may be a letter or a telephone inquiry. It should be remembered that this may be the only direct contact that the company will ever have with some of the customers. Most people will go for years receiving good service and a monthly bill. The bill will be paid and not much thought given to the effort necessary to make this often taken-for-granted service available to them.

Of course, at some time nearly every customer will have a problem that he feels is worthy of attention. To the main or woman who is called upon to assist the customer, the matter may seem routine and perhaps trivial. Remember, though, that this routine every-day occurence has now happened to this customer, perhaps for the first time. It is very close to him and, therefore, very important. It could be a bill which he feels is too high. It might be the location of a fire hydrant which will inconvenience him and he doesn't understand why it shouldn't be located next door or across the street. It might be the installation of a main which will bring him fire protection and a lower insurance premium, but at the moment, is destroying the beauty of a lawn which represents to him a considerable investment in time, work and money. It could be a temporary interruption of service necessary to bring him even better service or to make necessary repairs, but at the moment it is nothing but a nuisance. All of these things and many others are every-day occurrences to the people who work with them, but to the customer they are real problems and he has a right to expect sincere consideration and an adequate explanation.

The collector has a difficult job to perform. He must bring in money on the delinquent accounts or terminate service. He can, however, build good will by being courteous and considerate while at the same time being firm and businesslike. The serviceman, inspector, or troubleshooter has a very good opportunity to further good public relations if he realizes that his call is the result of a difficulty or inconvenience experienced. If he will provide help in a considerate, courteous and efficient manner, he cannot help but gain good will for his company. Every individual connected in any way with the operation should feel that achieving and maintaining good public relations is an important part of his job.

No one should think that it is someone else's job to hear and satisfy a complaint resulting from what has or has not been done. A better attitude would be to perform every job in such a manner as to prevent the complaint from ever existing. A few general rules which will promote good will are as follows:

Good Will Rules

1. *Notify customers in advance whenever possible.* People should be made aware of an inconvenience which they are going to experience. Further, a brief explanation should be given so that the individual can better understand the reason for the inconvenience and better appreciate the improvement or benefits that will result.

2. *Complete job in as little time as possible.* If the job is of long duration, it might be planned and executed in short sections so that the length of time that it will directly inconvenience any particular customer or group of customers will be as short as possible.

3. *Keep conditions as pleasant as possible while the job is in progress.* Members of the crews should be careful not to destroy or damage customer's property. Driveways should be kept useable. Materials and equipment should be so placed as to not present any unnecessary inconvenience or hazard. Special traffic problems should be considered and an attempt should be made to cooperate with the businessmen along the job so as to reduce to a minimum the disruptions of the man's business.

4. *Maintain friendly attitude.* The foreman on the job should be prepared to intelligently answer questions related to the duration and other aspects of the job and should also be prepared to handle the many questions which he will receive about what is going on. A pleasant and cooperative attitude on the part of the person in charge can do much to insure smooth and efficient completion of the work.

5. *Leave the area in good condition when the job is completed.* Every effort should be made to leave the area as nearly as possible in the same condition in which it was found. In fact, the job should not be considered complete until this is done. Some simple rules of good housekeeping, together with consideration for the customer, will surely gain favorable comment from the public.

It may be a bit repetitious but, a few don'ts might also be mentioned.

Don't give the customer the impression that he is an interruption of your work when he is the purpose of it.

Don't block sidewalks and streets unnecessarily.

Don't schedule jobs in heavy traffic areas during peak hours if it can be avoided.

Don't engage in reckless driving.

Don't keep the company's property in an unsightly condition. In fact, don't do anything if it can be avoided that will damage the community, injure or irritate the people, offend its traditions or customs, or in any way show disregard for the well-being and goodwill of the people of the community.

The definition of "tact" seems to embody a basic principle of public relations. TACT—A quick or intuitive appreciation of what is fit, proper or right: fine or ready mental discernment shown in saying or doing the proper thing so as to win goodwill or especially in avoiding what would often disturb; skill or facility in dealing with men or emergencies.

"Don't give the customer the impression that he is an interruption of your work when he is the purpose of it."

The editor's comments

A Review of Progress

With this January issue, WATER & SEWAGE WORKS presents, for the first time in its history, a complete review of progress during the past year in the field which the magazine covers.

For many years, it has been the practice to publish a review of water supply in the January issue and a review of sewage disposal in the February issue. As the field has grown, however, more and more aspects became common to both phases. Consideration of this fact made it seem quite inadequate to devote but a few pages to each phase of the field. Therefore, it was decided to make the January issue a special review number devoted to all facets of the entire field. In this issue, the reader will find, not only articles on last year's progress in water supply and wastewater technology, but also articles on progress in research, in construction, and in new equipment.

Among the many interesting factors and accomplishments denoting progress, a few stand out. Among these were the Do-It-Now program of AWWA which sparked water works construction and the P.L. 660 grants-in-aid program which helped sewage works construction. As a result of these factors, the estimated expenditures for construction of water works in 1958 was $550 million or only 2 per cent off from 1957, whereas a decrease of 7 per cent had been predicted. Estimated expenditures for sewage works construction was $840 million, or a gain of 8 per cent, whereas a decrease of 4 per cent from 1957 had been predicted.

Research efforts continued to show the effects of the U.S. PHS research grants program. Ideas for new equipment and improvements in old equipment continued to result from the American system of competitive business. Among several ideas which gained attention, either as new approaches or new applications, in this country, were diatomite filtration by a reversible system, microstraining, polyelectrolites as coagulant aids, the use of conductivity measurements as a key to coagulation control, new type filtering media for vacuum filters, and the incineration of sludge by wet combustion methods.

Both the American Water Works Assn. and the Federation of Sewage and Industrial Wastes Assns. took great strides forward in their efforts to upgrade and improve both the field and the persons engaged in it. AWWA's program of "Operation Water Works Advancement" bids fair to become a vitalizing factor in elevating the status and stature of water works managers everywhere. The Federation's program, began on a less expensive scale but had had the same general aim, that of providing advancement for persons in the field of wastewater technology. Both of these programs can be expected to bear fruit in the coming years.

One can hardly close his comments on progress during the past year without mentioning the fact that both AWWA and FSIWA found it necessary to raise annual dues in order to provide the kind of service to which the members are entitled and which they desire. The increase in AWWA dues will go into effect in 1959, but the new Federation dues will not go into effect until 1960. Although both raises will provide additional services, there remains the stark fact that it was inflation which has so increased the cost of operation of the organizations, that services desired by the members could not be provided by the dues rates in existence last year.

And a Look at the Future

This issue also carries an article on the future of water supply and wastewater technology. This article was presented as a paper, at a joint meeting of the Fla. Sect. AWWA and Fla. S&IWA; the paper was released by AWWA and FSIWA for publication here in this issue on a review of progress.

The article takes a look "at both sides of the present" and offers a little crystal ball gazing. Some of the ideas presented may be accomplished in the next year or two; some in 10 to 20 years, some in three or four decades; some will never come to pass.

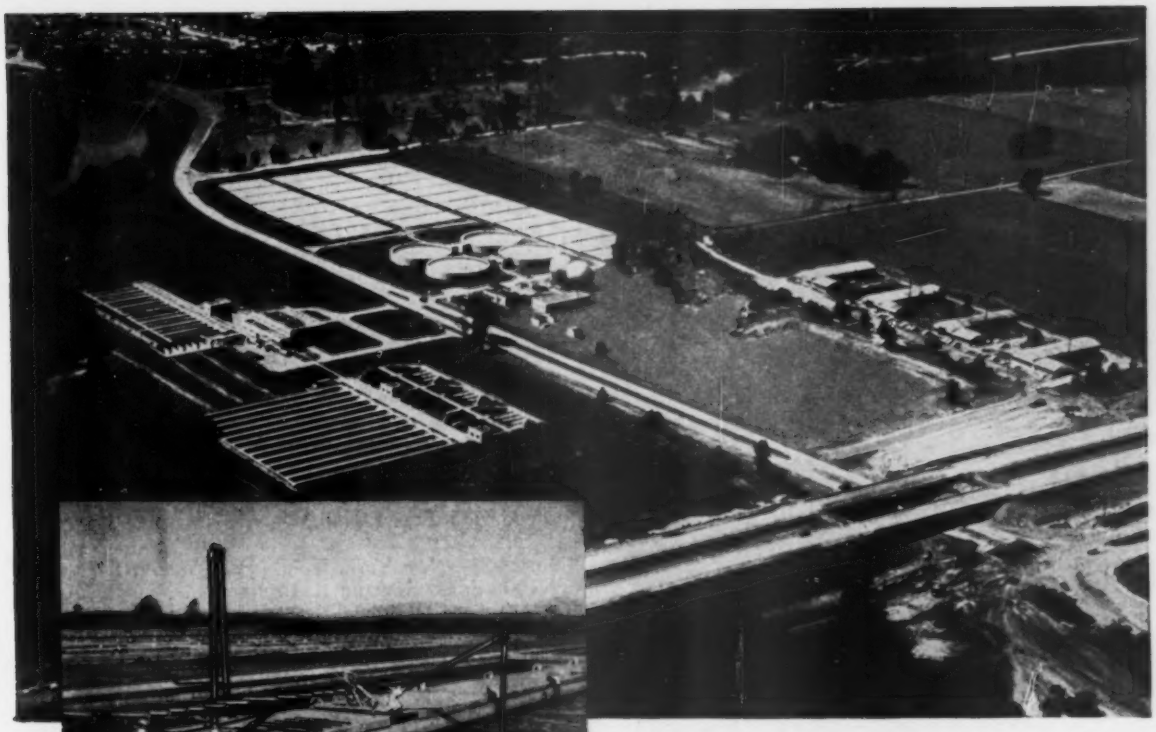
Of more pressing interest to everyone, than the future ten years hence, is: What about next year? Particularly, what can we expect in the way of construction? Current predictions for water works construction in 1959 are for expenditures of $570 million (up 4 per cent from 1958); predictions for sewage works construction in 1959 are for expenditures of $950 million (up 13 per cent over 1958).

This prediction for water works does not take into account any further possible effect of AWWA's Do-It-Now program and the sewage works prediction does not consider the possible effect if Congress should decide to increase the P.L. 660 grants-in-aid program from $50 to $100 million a year.

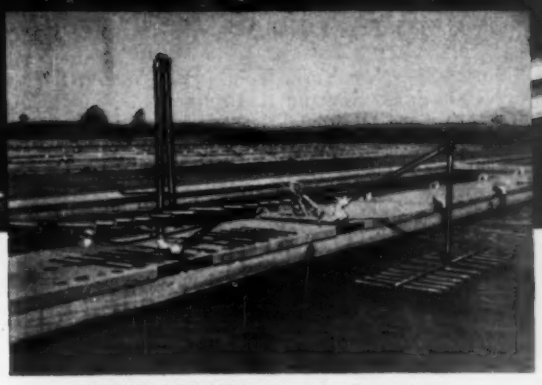
For the coming year we can expect a population increase of at least 3 million persons and beyond next year we can look to a population of from 230 to 273 million by 1980. These figures should give us all a spur to proceed with planning for the next quarter century.

With the increase of construction expenditures of only 4 to 13 per cent in the next twelve months, it is certain that the backlog of needed construction of new and replacement facilities will continue to grow. We should be spending at the rate of $2.3 billion a year (not $1.5 billion) to keep even with our needs.

George E. Symons.



South Bend, Indiana Sewage Treatment Plant . . .
Consoer, Townsend & Associates, Consulting Engineers



SWING DIFFUSER* raised for inspection

"from Chicago"

SWING DIFFUSER* AERATION EQUIPMENT

For Dependable, Continuous Aeration

*a trademark of Chicago Pump Company

More than 10,000 SWING DIFFUSER* installations in over 300 cities . . . including South Bend New York • Philadelphia Los Angeles • Miami Toledo • Boston • Chicago

SWING DIFFUSER* Aeration Equipment, the heart of the aeration process, provides . . .

- maximum efficiency of aeration through use of the Wide Band Air Diffusion system
- easy accessibility for inspection without tank dewatering
- flexible field adjustment of air distribution
- uninterrupted operation without need for costly standby aeration tanks
- greatest rate of air diffusion per foot of tank required by *high rate aeration* processes

and now, even greater Swing Diffuser* performance is obtainable with the "Chicago" SUPER-CLEAN* Air Filter System . . . allowing less than 0.09 mg. of dirt per 1000 cubic feet of air to minimize particulate clogging.

See your nearest Chicago Pump Company Distributor or write direct for bulletins and complete engineering data.

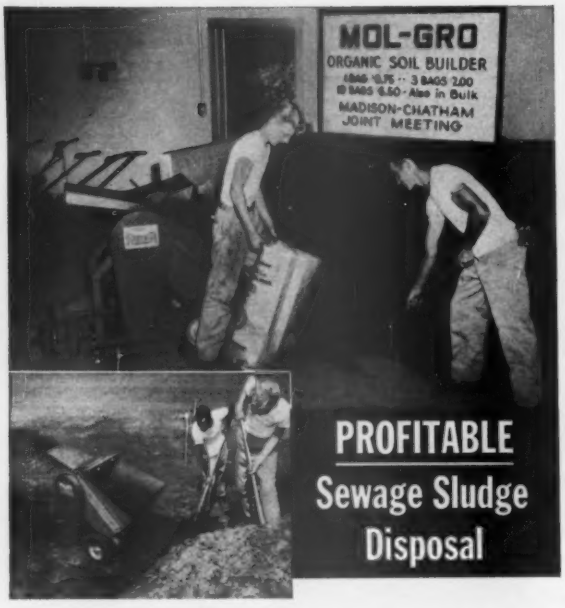
Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION

Chicago Pump Company

622 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

Copyright 1958—Chicago Pump Company



The Madison-Chatham (N.J.) Joint Meeting bags and sells their *Royerated sewage sludge cake.* While not big business, the operation does represent an additional source of municipal income.

The need for increasing municipal income keeps growing in importance. The climate of today's economy warns against tax increases. Economies of operation are being searched for.

One of the most obvious economies that any organization can practice is the elimination of waste. Yet many sewage plants continue to dump or burn their sludge cake—throwing away or sending possible income up in smoke.

In April 1957, Royer published a new edition of their "Sewage Sludge Utilization Datalog," pointing the way to turning sewage from an expense into a profit. Since then, we've gone through two printings.

If your community is still destroying this source of revenue, write today—and learn how you, too, may experience *profitable sewage sludge disposal.*

described in FREE DATALOG

Please send me a copy of your new edition of the information-packed "Sewage Sludge Utilization Datalog."

Name_____ Title_____

Plant_____

City_____ Zone____ State_____

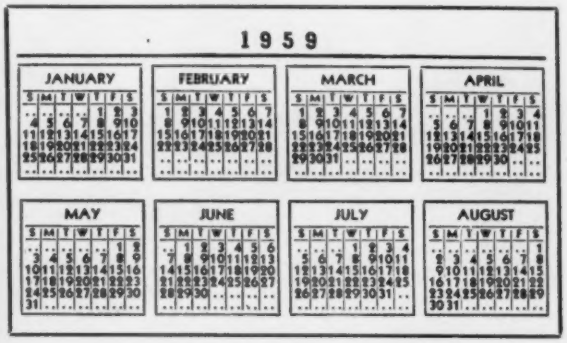
☐ I am interested in a demonstration of the Royer Shredder at work.

ROYER FOUNDRY & MACHINE CO.

ROYER

170 PRINGLE STREET
KINGSTON, PENNA.

Meetings



Jan. 7—Lawrence, Kan. *(Univ. of Kansas)*
9TH ANNUAL SAN. ENGR. CONFERENCE, Dan Leibengood, 115 Fraser Hall, Univ. of Kansas, Lawrence, Kan.

Jan. 22-23—New York, N. Y. *(Park-Sheraton Hotel)*
NEW YORK SEWAGE & INDUSTRIAL WASTES ASSN., Exec. Secy., Ralph C. Sweeney, State Dept. of Health, 55 Church St., White Plains, N. Y.

Jan. 26-30—Denver, Colo. *(Univ. of Colorado)*
WATER & SEWAGE PLANT OPERATORS SCHOOL, Univ. of Colorado Denver Extension Center, 1165 Broadway, Boulder, Colo.

Jan. 27—New York, N. Y. *(Park-Sheraton Hotel)*
NEW YORK SECTION, A.W.W.A., Mid-winter Luncheon, Secy., Kimball Blanchard, 19 W. 50th St., New York 20, N. Y.

Feb. 4-6—French Lick, Ind. *(Sheraton-French Lick Hotel)*
INDIANA SECTION, A.W.W.A., Secy., Chester H. Canham, State Bd. of Health, 1330 West Michigan St., Indianapolis 7, Ind.

Feb. 9-13—Los Angeles, Calif. *(Hotel Statler)*
AMERICAN SOCIETY OF CIVIL ENGINEERS, Exec. Secy., W. H. Wisely, 33 W. 39th Street, New York 18, N. Y.

Feb. 10—Newark, N. J. *(Essex House)*
NEW JERSEY SECTION, A.W.W.A., Winter Meeting, Secy., Albert F. Pleibel, 683 Prospect St., Maplewood, N. J.

Feb. 11-12—Portland, Maine
MAINE WATER UTILITIES ASSN., Secy. Gerard F. Laurin, 89 Western Ave., Augusta, Maine

Feb. 17—Salt Lake City, Utah *(Univ. of Utah)*
UTAH SEWAGE & INDUSTRIAL WASTES ASSN., Secy., Howard Hurst, 479 Harvard Ave., Salt Lake City 11, Utah.

Mar. 2-6—College Station, Texas *(A & M College)*
TEXAS WATER & SEWAGE WORKS ASSN., Annual Short School, Secy., V. M. Ehlers, 2202 Indian Trail, Austin 3, Texas

Mar. 6—Jackson, Miss. *(Robt. E. Lee Hotel)*
MISSISSIPPI SEWAGE & IND. WASTES ASSN., Secy., Neil G. McMahon, Mississippi State Bd. of Health, Jackson, Miss.

Mar. 11-13—Chicago, Ill. *(Morrison Hotel)*
ILLINOIS SECTION, A.W.W.A., Secy., Dewey W. Johnson, Cast Iron Pipe Research Assn., Suite 3440 Prudential Plaza, Chicago 1, Ill.

Mar. 11-13—Atlantic City, N. J. *(Traymore Hotel)*
NEW JERSEY SEWAGE & INDUSTRIAL WASTES ASSN., Secy., Anthony T. Leahey, P. O. Box 32, West Trenton 8, N. J.

CONTINUED ON PAGE 104A

Consulting Engineers: Henningson, Durham & Richardson, Omaha—Colorado Springs
General Contractor: Parsons Construction Co., Omaha

Omaha's Papillion Creek sewage treatment plant, as it will appear upon completion of a $2-million improvement program. The handsome building at left will house the C-E Raymond Flash Drying and Incineration System. Local residents will be able to buy bagged Flash Dried sludge at the conveniently located entrance marked "sales."

SELECTED BY OMAHA...

C-E RAYMOND for sludge disposal

Omaha's expanded sewage treatment facilities will serve an equivalent population of 122,500 and will have an influent capacity of 12 mgd. Activated sludge filter cake from this modernized plant will be Flash Dried in a C-E Raymond Flash Drying and Incineration System, reducing it to even-size particles of uniform moisture content.

Selling this product for use as a soil conditioner and using it on municipal parks, lawns, and golf courses will help to defray plant operating expenses. The surplus can be burned to a sterile, clinker-free ash. C-E Raymond is the *only* system that permits both drying and incineration – separately or together – in any proportion.

High temperature deodorization and efficient fly ash collection here will assure that nearby residents are not annoyed by air pollution.

Controlled drying . . . efficient incineration . . . economy of operation . . . high temperature deodorizing and fly ash collecting equipment integral with the system . . . these are some of the reasons communities, large and small, throughout the country are choosing C-E Raymond.

For more information, contact the C-E office nearest you. Our specialists will be glad to discuss, with you or your consultants, how this system can benefit your community.

COMBUSTION ENGINEERING

RAYMOND DIVISION, 1315 North Branch Street, Chicago 22, Illinois
Eastern Office: 200 Madison Avenue, New York 16, N. Y.
Western Office: 510 West Sixth Street, Los Angeles 14, Calif.
Canada: Combustion Engineering-Superheater Ltd.

C-179

ALSO FLASH DRYING AND INCINERATION SYSTEMS FOR INDUSTRIAL WASTE DISPOSAL

SEND FOR FREE

CHLORINE MANUAL

Get 76 pages of useful, quickly digested facts on chlorine.

Bulletin 125 is a de luxe, stiff-covered, soil-resistant manual, organized for easy reference. It . . .

- Lists physical properties with helpful charts and graphs.
- Tells how to handle chlorine safely.
- Describes and illustrates equipment.
- Describes standard containers.
- Tells how chlorine is made. Gives history of famous Hooker S cells.
- Lists many services available from Hooker.

Please send free copy of Bulletin 125 to:

Name and title .....

Company .....

Address .....

HOOKER CHEMICAL CORPORATION

NIAGARA FALLS, N.Y.

Sales Offices: Chicago, Detroit, Tacoma, Los Angeles, New York, Niagara Falls, Philadelphia, Worcester, Mass.

HOOKER CHEMICALS PLASTICS

In Canada: Hooker Chemicals Ltd., N.Vancouver, B.C.

Mar. 16-18—Little Rock, Ark. *(Marion Hotel)*
ARKANSAS WATER & SEWAGE CONF., C. W. Oxford, Univ. of Arkansas, Fayetteville, Ark.

Mar. 18-20—Baton Rouge, La. *(Louisiana State Univ.)*
22ND ANNUAL SHORT COURE FOR SUPTS. & OPERATORS OF WATER AND SEWERAGE SYSTEMS, Fred H. Fenn, Dean, Coll. of Engrg. and Director, Engrg. Exp. Station, Louisiana State Univ., Baton Rouge, La.

Mar. 19—Boston, Mass. *(Statler Hotel)*
NEW ENGLAND SECTION, A.W.W.A., Secy., J. E. Revelle, Chicago Bridge & Iron Co., 201 Devonshire St., Boston 10, Mass.

Apr. 2-3—Chapel Hill, N. C. *(Univ. of North Carolina)*
EIGHTH SOUTHERN MUNICIPAL & IND. WASTE CONF., Prof. Dan A. Okun, Univ. of North Carolina, Chapel Hill, N. C.

Apr. 5-8—Columbia, S. C. *(Wade-Hampton Hotel)*
SOUTHEASTERN SECTION, A.W.W.A., Secy., N. M. de Jarnette, State Dept. of Public Health, 309 State Office Bldg., Atlanta 3, Ga.

Apr. 5-10—Cleveland, Ohio *(Public Auditorium)*
5TH NUCLEAR CONGRESS sponsored by AWWA and other Societies, T. A. Marshall, Jr., Mgr., 1959 Nuclear Congress, c/o Engineers Joint Council, 29 W. 39th St., New York 18, N. Y.

Apr. 8-10—Rochester, N. Y. *(Powers Hotel)*
N. Y. SECTION, A.W.W.A., Secy., Kimball Blanchard, 19 W. 50th St., New York 20, N. Y.

Apr. 9-11—Glendive, Mont. *(Jordan Hotel)*
MONTANA SECTION, A.W.W.A., AND MONTANA SEWAGE & INDUSTRIAL WASTES ASSN., Joint Meeting, Secy., Arthur W. Clarkson, State Board of Health, Helena, Mont.

Apr. 13-14—Luray, Va. *(The Mimslyn)*
VIRGINIA INDUSTRIAL WASTES & SEWAGE WORKS ASSN., Secy., O. J. Hand, c/o Hercules Powder Co., Hopewell, Va.

Apr. 15-17—Lincoln, Neb. *(Cornhusker Hotel)*
NEBRASKA SECTION, A.W.W.A., Secy., Rupert C. Ott, Jr., Neptune Meter Co., 2818 - 21st St., Columbus, Nebr.

Apr. 16-18—Phoenix, Ariz. *(Hi-Way House Hotel)*
ARIZONA SECTION, A.W.W.A., Secy., Stanford I. Roth, Div. of Water & Sewers, Phoenix, Ariz.

Apr. 22-24—Pittsburg, Kansas *(Besse Hotel)*
KANSAS SECTION, A.W.W.A., Secy., Harry W. Badley, Neptune Meter Co., 119 West Cloud, Salina, Kan.
(Jointly With)
KANSAS SEWAGE & INDUSTRIAL WASTES ASSN., Secy., James F. Aiken, Jr., 1900 East Ninth, Wichita, Kan.

Apr. 23-25—Vancouver, B. C. *(Vancouver Hotel)*
PACIFIC NORTHWEST SECTION, A.W.W.A., Secy., Fred D. Jones, W. 2108 Maxwell Ave., Spokane 11, Wash.

Apr. 29-May 2—Long Beach, Calif. *(Hotel LaFayette)*
CALIFORNIA SEWAGE & INDUSTRIAL WASTES ASSN., Secy., Alfred Leipzig, 12000 Vista Del Mar, Venice, Calif.

May 3-6—Montreal, Can. *(Queen Elizabeth Hotel)*
CANADIAN SECTION, A.W.W.A., Secy., Dr. A. E. Berry, 72 Grenville St., Toronto, Ont., Can.

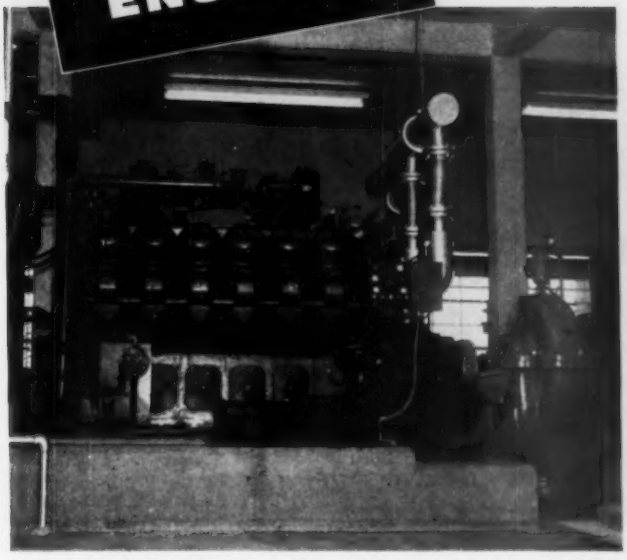
May 5-7—Lafayette, Ind. *(Purdue University)*
14TH PURDUE INDUSTRIAL WASTE CONF., Chairman, Prof. Don E. Bloodgood, Purdue University, Lafayette, Ind.

May 4-8—Cleveland, Ohio *(Hotel Cleveland)*
AMERICAN SOCIETY OF CIVIL ENGINEERS, Exec. Secy., W. H. Wisely, 33 W. 39th Street, New York 18, N. Y.

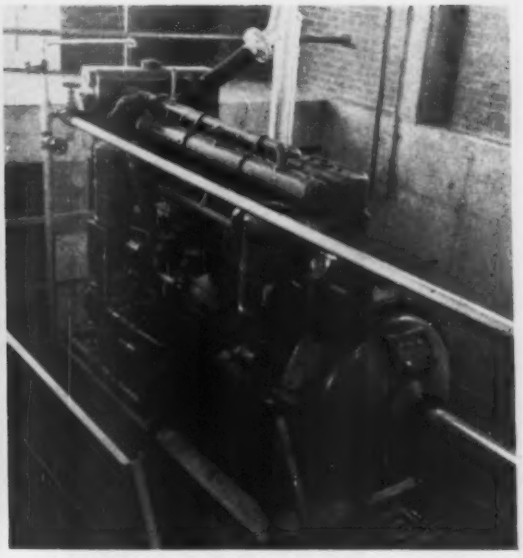
CONTINUED ON PAGE 106A

Oklahoma City's Lake Hefner Municipal Filtration Plant

...has three ROILINE ENGINES pulling the pumps



Model L-3460, max. hp 595 at 1350 rpm on natural gas

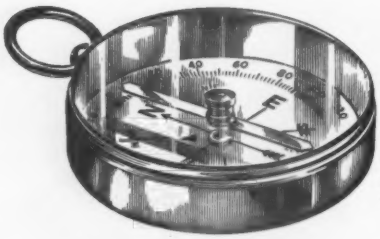


Model F-1500, max. hp 215 at 1200 rpm on natural gas

• The municipal filtration plant of Oklahoma City, Okla. at Lake Hefner has three *Roiline* engines pulling the pumps. Pictured above are two Model L-3460 *Roilines* (max. hp 595 at 1350 rpm on natural gas) each engine pulling a ten million gallon Gould pump; and a Model F-1500 *Roiline* engine (max. hp 215 at 1200 rpm on natural gas) operating a fifteen million gallon Peerless Hydrafoil at low lift pump station. In addition, but not illustrated, is a Model L-3000 *Roiline* engine driving a 250 KVA generator. The Carson Machine & Supply Co. of Oklahoma City, Okla., made the installation. Send for Bulletins. 395

WAUKESHA MOTOR COMPANY • WAUKESHA, WISCONSIN

NEW YORK • TULSA • LOS ANGELES



ENCOMPASSING THE WORLD...

INFILCO

EMINENCE IN EQUIPMENT DESIGN FOR WATER, SEWAGE & WASTE TREATMENT . . . SINCE 1894

INFILCO INC. ✱ GENERAL OFFICES: TUCSON, ARIZONA, FIELD OFFICES THROUGHOUT THE UNITED STATES AND IN FOREIGN COUNTRIES

57099-A

June 4-6—Tuscaloosa, Ala. *(Univ. of Alabama)*
ALABAMA WATER & SEWAGE ASSN., Secy., E. J. Finnell, Jr., University of Alabama, University, Ala.

June 17-19—Cincinnati, Ohio *(Netherland Hilton Hotel)*
OHIO SEWAGE & INDUSTRIAL WASTES TREATMENT CONF., Secy., Cleamon E. Lay, Ohio Dept. of Health, 101 North High St., Columbus 15, Ohio

June 24-26—Minneapolis, Minn. *(Pick Nicollet Hotel)*
CENTRAL STATES SEWAGE & INDUSTRIAL WASTES ASSN., Secy., Scott A. Linsley, P. O. Box 3598, Child Rd., St. Paul, Minn.

July 12-17—San Francisco, Calif. *(Civic Auditorium)*
A.W.W.A. CONVENTION, Secy., Harry E. Jordan, A.W.W.A., 2 Park Ave., New York 16, N. Y.

July 12-17—San Francisco, Calif. *(Civic Auditorium)*
CALIFORNIA SECTION, A.W.W.A., In Conjunction with National Convention, Secy., Roy E. Dodson, Jr., San Diego Water Dept., Balboa Park, San Diego 1, Calif.

Aug. 12-14—University Park, Pa. *(Pa. State University)*
PENNSYLVANIA SEWAGE & INDUSTRIAL WASTES ASSN., Secy., J. R. Harvey, 996 S. Main Street, Meadville, Pa.

Sept. 2-4—Huron, So. Dak. *(Marvin-Hughitt Hotel)*
SOUTH DAKOTA WATER & SEWAGE WORKS CONF., Secy., Don C. Kalda, Pierre, So. Dak.

Sept. 7-9—Jackson, Wyoming *(Jackson Lodge)*
ROCKY MOUNTAIN SEWAGE & INDUSTRIAL WASTES ASSN., Secy., Verne E. Plath, P. O. Box 149, Englewood, Colo.

Sept. 9-11—Milwuakee, Wis. *(Hotel Schroeder)*
WISCONSIN SECTION, A.W.W.A., Secy., Harry Breimeister, City Engrs. Office, City Hall, Milwaukee 2, Wis.

Sept. 14-16—Lexington, Ky. *(Lafayette Hotel)*
KENTUCKY-TENNESSEE SECTION, A.W.W.A., Secy., J. Wiley Finney, Jr., Howard K. Bell, Cons. Engrs., 553 South Limestone St., Lexington, Ky.
(Jointly With)
KENTUCKY-TENNESSEE INDUSTRIAL WASTES & SEWAGE WORKS ASSN., Secy., S. Leary Jones, Cordell Hull Bldg., Nashville, Tenn.

Sept. 16-18—Upper Saranac Lake, N. Y. *(Saranac Inn)*
NEW YORK SECTION, A.W.W.A., Secy., Kimball Blanchard, 19 W. 50th Street, New York 20, N. Y.

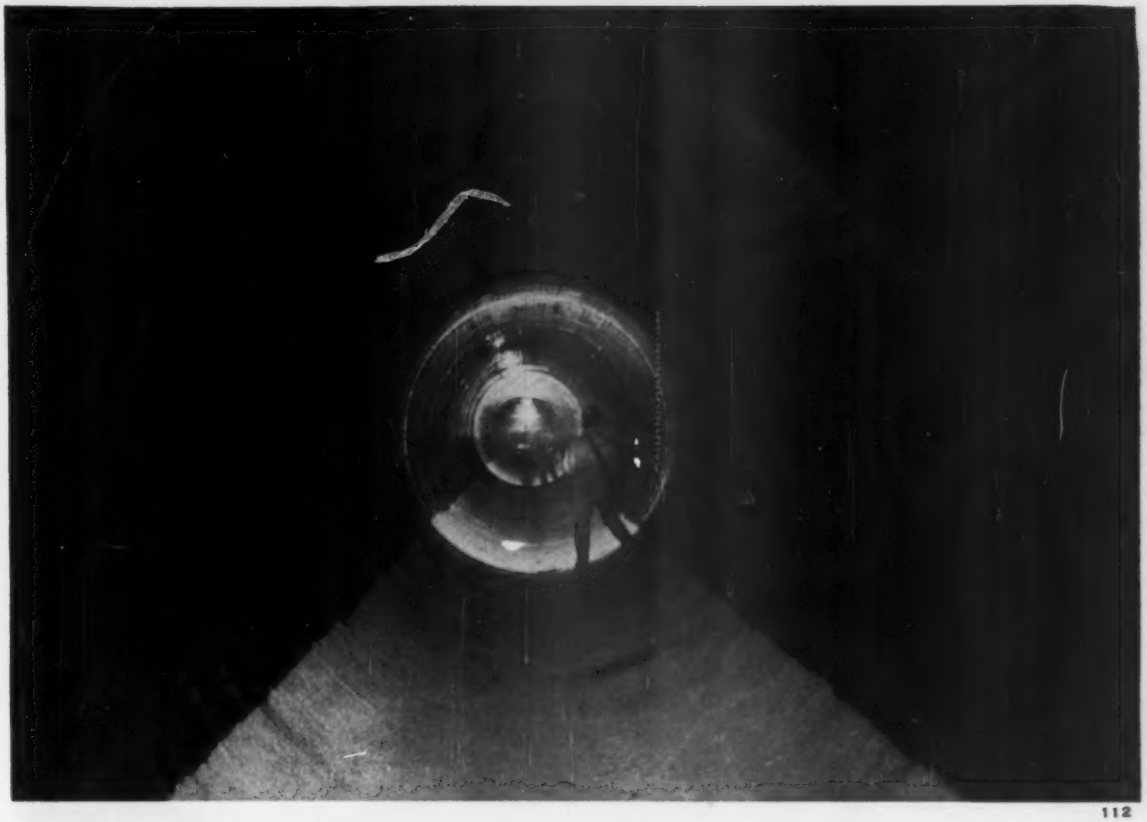
Sept. 20-23—Lake Placid, N. Y. *(Lake Placid Club)*
NEW ENGLAND WATER WORKS ASSN., Secy., Joseph C. Knox, N.E.W.W.A., 73 Tremont St., Boston 8, Mass.

Sept. 23-25—Saginaw, Mich. *(Bancroft Hotel)*
MICHIGAN SECTION, A.W.W.A., Secy., T. L. Vander Velde, State Dept. of Health, DeWitt Road, Lansing 4, Mich.

Sept. 27-29—Kansas City, Mo. *(Hotel President)*
MISSOURI SECTION, A.W.W.A., Secy., Warren A. Kramer, Div. of Health, State Office Bldg., Jefferson City, Mo.

Sept. 28-30—Toronto, Can. *(Royal York Hotel)*
CANADIAN INSTITUTE ON SEWAGE AND SANITATION, Secy., Dr. A. E. Berry, 72 Grenville St., Toronto, Ontario, Can.

Oct. 11-15—Dallas, Texas *(Memorial Auditorium)*
FEDERATION OF SEWAGE & INDUSTRIAL WASTES ASSN., Exec. Secy., Ralph E. Fuhrman, 4435 Wisconsin Ave., N.W., Washington 16, D. C.



112

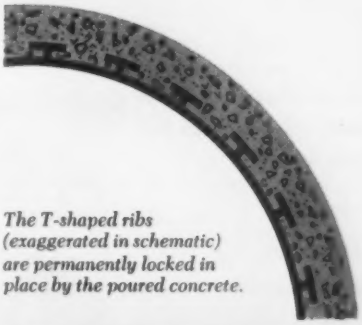
This Sewer will go a Long Way

Not only will this 9¾-foot outfall sewer extend eight miles, but it will go a long way in years of trouble-free service. The engineers who designed it say that it will still be functioning perfectly in the year 2000.

Their confidence is based on wise choice of construction materials. Every joint of pipe, every foot of monolithic tunnel, every structure is built of reinforced concrete to obtain structural strength at low cost. Every surface above the low flow line is completely covered by a continuous membrane of T-Lock Amer-Plate®, the vinyl lining that is impervious to the corrosive action of oxidized hydrogen sulfide *at any level of concentration.*

The engineers know that no one can accurately predict future rates of H_2S gas generation, so they have insured the ultimate life of the concrete by investing an extra 8 to 10% for T-Lock protection. They predict that this "extra" will spare their city the cost of a replacement sewer in about 20 years, and *save the taxpayers millions of dollars!*

Because of obvious and substantial savings such as this, millions of square feet of T-Lock are now in use in progressive municipalities from coast to coast. These include Los Angeles; Topeka; Wichita; Sioux Falls; Shreveport; Washington, D.C.; San Diego; Mansfield, Ohio; Huntington, W.Va.; Hutchinson, Kan.; and Orange County, Calif. T-Lock Amer-Plate is also on current specifications for many other municipalities. For complete list of users and specifiers, plus technical data and a typical specification, write:



The T-shaped ribs (exaggerated in schematic) are permanently locked in place by the poured concrete.

There is no limitation on size or shape of structures which may be protected with T-Lock Amer-Plate.

Amercoat® CORPORATION

Dept. WA

4809 Firestone Blvd.

South Gate, California

Evanston, Ill. • Kenilworth, N. J. • Jacksonville, Fla. • Houston, Texas

Crispin

AIR VALVES

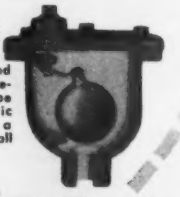
...control air safely and efficiently

These basic advantages are yours when you use Crispin Air Valves . . . simplified construction, easy accessibility, maximum durability, minimum maintenance and efficient operation. You're safe with Crispin Air Valves on the job!

Crispin COMBINATION AIR VALVES . . . reduce installation and operating costs where a combination of an Air and Vacuum Valve and a Pressure Air Valve are required.

Crispin NEGATIVE PRESSURE AIR VALVES . . . release air semi-automatically from pipeline siphons to end the danger of throttled pipelines.

Crispin MIDGET AIR VALVES . . . ideal for venting hot water systems and are particularly useful in panel type units—synthetic plunger makes a perfect seal at all times.



AIR CONTROL VALVES FOR OVER 45 YEARS

multiplex

MANUFACTURING COMPANY

BERWICK, PENNSYLVANIA

Dept. B

Write, wire or phone for complete information on dependable Crispin Air Valves that keep your pipelines open for safe, economical operation

GUNITE does it 2 times as fast at 1/2 the cost

"Gunite" is the modern process (sand and cement applied pneumatically) for repairing, constructing, lining:

- **Reservoirs**
- **Dams**
- **Filter Plants**
- **Sewage Disposal Plants**
- **Tanks**
- **Stadiums**
- **Bridges**
- **Sea Walls**
- **Swimming Pools, etc.**

Write FOR MORE INFORMATION, INCLUDING 48 PAGE "GUNITE" BOOKLET.

PRESSURE Concrete Co.

FLORENCE, ALA. 1555 Helton Street

OTHER OFFICES IN

CHICAGO, ILL. 30 W. Washington Street

NEWARK 5, N. J. 193 Emmet Street

New Bulletins

AVAILABLE FREE

Tank Capacity Slide Rule Calculator

119

Hammond Iron Works, Warren, Pa., has available a handy, pocket size slide rule calculator for determining capacity and size of storage tanks.

The new Hammond slide rule calculator furnishes information on tanks up 100 ft high and 300 ft in diameter. Capacities are given in gallons, barrels and pounds of water. Additional information obtainable with the Hammond Calculator includes: decimal equivalents of a foot for all inch units and fractions; equivalent volumetric units; and steel plate weights for thicknesses from 3/16" to 1".

Ion Exchanger Handbook

120

National Aluminate Corp., Ion Exchange Div., Chicago, Ill., has just published a bulletin entitled "Water Conditioning with Nalcite Ion Exchanger." This new 60 page handbook explains the ion exchange method of water conditioning. Softening, dealkalizing, and demineralizing processes are discussed from the standpoint of equipment and chemicals required and quality of water produced.

Concrete Tanks for Water and Sewage Treatment

121

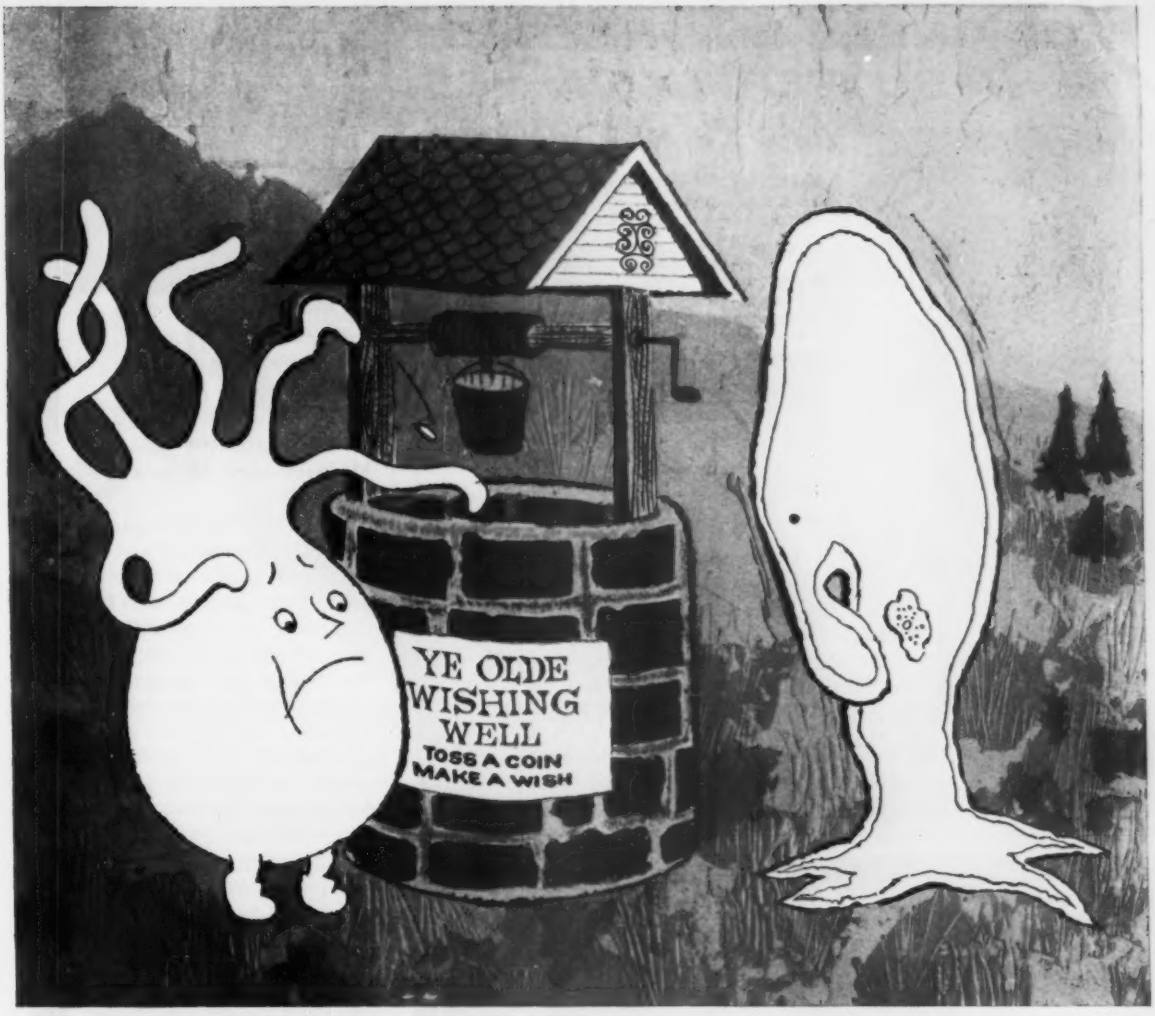
The Preload Co., Inc., New York, N. Y., has just released a bulletin that covers the history of prestressed concrete tanks in U. S. A. and abroad with a description of several recent record breaking storage tanks. This new bulletin also gives details on design, construction, cost estimating and maintenance of prestressed concrete tanks.

Low Pressure Compressors

122

Joy Manufacturing Co., Pittsburgh, Pa., has just published a new eight page bulletin covering the company's complete line of heavy duty, low pres-

CONTINUED ON PAGE 110A



"I wish Columbia-Southern would stop making **PITTCHLOR**®!"

Not a chance of that wish coming true, Algie.

Pittchlor kills chlorine-susceptible bacteria and algae on contact, that's why it's such a favorite with both water works and sewage disposal plant operators.

Pittchlor is a high-test calcium hypochlorite containing a minimum of 70% available chlorine. Its dry, granular form permits ease of application either manually or by mechanical feeders.

In addition, Pittchlor helps in slime and odor control, and it is the perfect source for emergency and stand-by chlorination.

For complete information on how this versatile chlorinating agent can help you, write today to our Pittsburgh office for a free Pittchlor folder. No obligation, of course.

PITTCHLOR available in
2½ lb. (6 per carton) and
5 lb. (9 per case)
resealable cans.
Also in 100 lb. drums.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

A Subsidiary of Pittsburgh Plate Glass Company • One Gateway Center, Pittsburgh 22, Pennsylvania

DISTRICT OFFICES: Cincinnati, Charlotte, Chicago, Cleveland, Boston, New York, St. Louis, Minneapolis, New Orleans, Houston, Philadelphia, Pittsburgh, Dallas, San Francisco. IN CANADA: Standard Chemical Limited

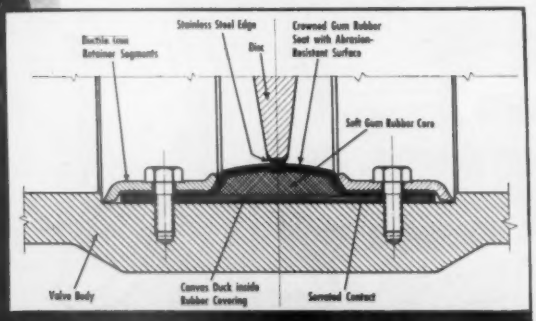
ROCKWELL-ENGINEERED AWWA BUTTERFLY VALVES

Most Advanced Design

Rockwell's new "Wedge-Lock" design meets and exceeds the most rigorous AWWA specifications for tight closure and long, trouble-free service.

In the valve's most vital part—the valve seat—the stainless steel-edged disc seats tightly against the crowned, abrasion-resistant surface of the multi-ply rubber seat. The entire seat insert is secured to the body by serrated contact with the retainer segments. The entire seat can be conveniently removed and replaced at site of installation.

Get Bulletin No. 581.

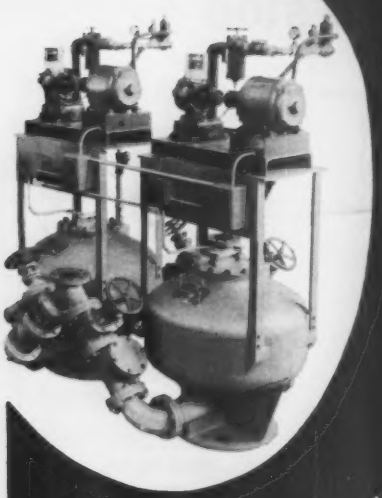


W. S. ROCKWELL COMPANY

2528 ELIOT STREET • FAIRFIELD, CONN.

Sales Representatives in Principal Cities

KOMLINE-SANDERSON PNEUMATIC SEWAGE EJECTOR SYSTEMS PROVIDE:



ASSURANCE—of carefully designed equipment, ruggedly constructed to give exceptionally long life and maintenance-free service.

ACCEPTANCE—of Komline-Sanderson Ejectors by more and more municipalities proves their worth

APPROVAL—of design application and components of ejectors by prominent consulting engineers insures your satisfaction.

WRITE FOR CATALOG NO. KSM-2

MECHANICAL EQUIPMENT DIVISION

KOMLINE-SANDERSON ENGINEERING CORPORATION

102 Holland Avenue, Peapack, New Jersey

New Bulletins

CONTINUED FROM PAGE 108A

sure compressors. Specifications on three models ranging from 756 to 7392 cfm and a detailed sectional drawing are included.

There is also a complete run-down with illustrations on all the vital parts and features.

Valve-Regulator Maintenance Manual

123

Rockwell Mfg. Company's Meter and Valve Division, Pittsburgh, Pa., has announced that complete installation, operation and maintenance instructions for Rockwell-Nordstrom valve-regulators are described in a new 16 page photo-illustrated manual.

The Rockwell-Nordstrom valve-regulator, introduced last year, is a pneumatically controlled, cylinder operated, lubricated plug valve regulator designed to provide high-pressure large-volume gas regulation with minimum pressure loss.

Typical installations, mounting arrangements and piping arrangements are illustrated in the manual. The manual also includes line, cutaway and schematic drawings and characteristic curves for the valve positioner.

In addition to the installation, operation and maintenance instructions, the manual includes special sections devoted to: typical operational troubles, how to check troubles, orifice and nozzle cleaning, how the positioner and controller works, adjustments, etc.

Typical installations for the Rockwell-Nordstrom Valve regulator, which operates most effectively on gas lines where large volumes of gas are encountered, include controlling high pressure gas from transmission lines, storage and town border stations.

Slide Selector For Liquid Level Gages and Valves

124

Jerguson Gage & Valve Co., Burlington, Mass., has announced a new Slide Selector for easy selection of the

CONTINUED ON PAGE 112A

NEW **Wedge-Lock*** JOINTS

Greatest Contribution to Sanitary Engineering since Vitrified Clay Pipe

LIKE A RAILROAD COUPLING... WEDGE-LOCK JOINTS WEDGE IN! LOCK TIGHT! IN ONE SIMPLE, EASY OPERATION

When you want to set high performance standards . . . control infiltration to strict specifications and reducing pumping costs . . . handle root problems . . . insure completion of the job exactly as originally designed . . . maintain lower cost-in-place due to faster, easier installation . . . you'll call for the *best* factory-made joint. Bonded-on Wedge-Lock Joints go in as fast as the trench is dug . . . "snap" tight instantly, in continuous compression . . . last as long as the world's longest lasting pipe.

Always specify *Vitrified Clay Pipe*, with *Wedge-Lock Factory-Made Joints*. Write to listed manufacturers for literature or an actual Wedge-Lock demonstration.

*Patented . . . T.M. Reg. U.S. Pat. Off.

Wedge-Lock CLAY PIPE

THE FACTORY-JOINTED CLAY PIPE AVAILABLE NATIONALLY FROM LOCAL MANUFACTURERS

Order Wedge-Lock from any of these Vitrified Clay Pipe Manufacturers:

Cannelton Sewer Pipe Company, Cannelton, Ind.
The Evans Pipe Company, Uhrichsville, O.
The Logan Clay Products Company, Logan, Ohio
Pacific Clay Products, Los Angeles 54, Calif.
Pomona Terra-Cotta Company, Greensboro, N.C.
Graff-Kittanning Clay Products, Worthington, Pa.
Clay City Pipe Company, Uhrichsville, Ohio
Gladding, McBean & Company, Los Angeles 54, Calif. *(Sold under trade name, "SPEED-SEAL")*
Oconee Clay Products Company, Milledgeville, Ga.
Pine Hall Brick & Pipe Company, Winston-Salem, N.C.
The Robinson Clay Product Company, Akron 9, Ohio
Superior Clay Corporation, Uhrichsville, Ohio
The Stillwater Clay Products Company, Cleveland 16, Ohio

WLC-258-59

New Bulletins

CONTINUED FROM PAGE 110A

correct size and type of liquid level gages and valves for any job. The pocket size Selector condenses a wealth of specifications, sizes and other data in easy-to-use form.

The Selector Chart gives size numbers, visible glass and center-to-center connections for the complete line of Jerguson Gages in all types and pressure groups. Other data includes individual Pressure-Temperature graphs on each type of gage, illustrations of various gage-valve combinations, and cross-section illustrations and data on various types of valves.

F&P "Quick Shipment" Catalog & Price List

125

Fischer & Porter Co., Hatboro, Pa., has just published a 52 page catalog on process instruments available for quick shipment.

The catalog covers indicators, transmitters, recorders and controllers for flow, pressure, temperature, density, viscosity and consistency.

Standard instruments are stocked at warehouses in Chicago, Atlanta, Houston, Los Angeles and Toronto, in addition to the main factory at Hatboro, Pa. Ordering has been simplified by assigning a number to each instrument or combination of instruments and prices of all such items are given in a separate, enclosed price list.

pH Measurement Techniques

126

Beckman Scientific and Process Instruments Div., Fullerton, Calif., has released a new data sheet that presents techniques for making accurate pH measurements in usually troublesome samples such as soils, emulsions, suspensions and oils.

Proper care of pH electrode is discussed and step-by-step procedures are detailed for pH measurements in dry, porous samples, oils and other water insoluable liquids, slurries, sludges, and viscous, collodial and highly concentrated samples. Three separate procedures are outlined for proper soil pH measurements.

Water Requirements For Nuclear Plants

127

Graver Water Conditioning Co., New York, N. Y., has available a reprint of the article, "Ultra Pure Water—Prime Requisite for Nuclear Power Plant Cycles."

This paper, discusses the reasons for the extreme water purity requirements in nuclear cycles, including considerations of efficient heat transfer, radioactivity, corrosion, materials of cycle construction and fuel element fracture.

The reprint goes on to tell how purification is accomplished by "polishing" the condensate in nuclear cycles with scavenger demineralizer equipment so that the condensate contains impurities measurable in parts per billion.

Each of four important nuclear cycles is discussed and the water requirements for each are described as are the ways in which purity is achieved. The nuclear cycles are illustrated along with other important material in the article.

Submersible Pumps

128

Sumo Pumps Inc., Stamford, Conn., has just published a 4 page bulletin describing a wider range of 4 inch submersible pumps featuring new ratings and new performances.

Shaft-Mounted Speed Reducer

129

Link-Belt Company, Chicago, Ill., has issued a new 24 page book describing its completely new line of shaft-mounted speed reducers.

The book contains engineering and selection information on: single reduction drives in six sizes, with nominal ratios of 5 to 1 and capacities up to 50 horsepower; and double reduction drives in seven sizes, with nominal ratios of 15 to 1 and up to 40 horsepower.

The new drives can be mounted at angular as well as horizontal positions by using either tie rod or foot mountings. Positive lubrication is constantly assured by live-action oil spray generated automatically through gear rotation, regardless of the position in which the reducer is mounted. Precision housings and bearing seals keep oil in and dirt out.

Well Screen Pipe

130

Emsco Screen Pipe Co., Houston, Texas, has just published a new eight page catalog describing Screen Pipe for oil, gas and water wells, including the "More Area" Slotted Screen Pipe, Vertical Slotted and Drilled Hole Wire Wrapped Screen, and Prepacked Gravel Pack Screen, together with specifications of various types.

Control Valves

131

Conoflow Corp., Philadelphia, Pa., has just issued a new bulletin describing the company's complete line of Series LB Control Valves.

The bulletin is a well illustrated 12 page booklet which gives details on construction and operating characteristics of the Series LB Control Valve. It points out how the combination of single-seated valve body and rugged cylinder actuator of the LB Valve outmodes conventional diaphragm motor valves. The bulletin describes various design features such as an extra thick body wall which meets 600 lb ASA Rating in all sizes. It is shown that the LB Valve is available with separable or integral flanges, and that integral flanges meet all ISA Face-to-Face Dimensions. Other features described are a fully guided plug for positive alignment, and a "lift-out" seat ring design. Operation of the new Model J Valve Positioner is shown in detail. Exclusive piston "lipseals" are described as assuring bubble-tight sealing and frictionless, sensitive positioning.

Optional accessories are illustrated, including a handwheel operator, special construction for high and low temperature services, and a yoke-mounted

CONTINUED ON PAGE 114A

"That's a smart question, son . . . and the answer is 'experience'."

Inside every Ludlow fire hydrant and every Rensselaer fire hydrant you'll find working and structural parts — developed through nearly 100 years of sound experience — that fill these four basic requirements for a perfect hydrant:

SIMPLICITY OF DESIGN AND OPERATION

ABSOLUTELY TIGHT CLOSURE

NO FREEZING

NO FLOODING DUE TO STANDPIPE BREAKAGE

All Ludlow and Rensselaer hydrants are built for easy, dependable operation and long life, despite rough treatment and the most severe climate conditions. They're engineered for *performance* and meet all A.W.W.A. specifications. That's why they've been "watchdogs" of American property since 1861!

WRITE TODAY — for the L&R Fire Hydrant Catalogs, which show a model for every need.

LUDLOW & RENSSELAER

VALVES AND HYDRANTS

THE LUDLOW VALVE MANUFACTURING CO., INC., TROY, N. Y.–SINCE 1861

New Bulletins

CONTINUED FROM PAGE 112A

pressure controller. The advantages of tight shut-off in a control valve are explained, and complete specifications and valve sizing data are included.

Blowers For Vacuum Service

132

Roots-Connersville Blower, Division of Dresser Industries, Inc., Connersville, Ind., has just published a new bulletin covering the complete line of cycloidal blowers for vaccum service. The bulletin presents detailed design and construction data as an aid to proper application of this equipment in a wide range of process industries.

Slip Joint Clay Pipe

133

Robinson Clay Product Co., Akron, Ohio, has just released a completely new folder describing the company's Slip-Joint Clay Pipe. Designed for quick reference, this fully illustrated folder contains data on handling and installation of Robinson Slip-Joint Clay Pipe, with special emphasis on Slip-Joint fittings for all installation requirements.

Ion Exchange Regeneration

134

Graver Water Conditioning Co., New York, N. Y., has a new technical reprint on ten methods of ion exchange regeneration.

Diversified Product Booklet

135

Fischer & Porter Co., Hatboro, Pa., has just published a new full-color, 24 pp. Facilities Booklet that describes the diversified products of the company. Included are descriptions of flowmeters, process instrumentation, data reduction and automation equipment, chlorination equipment, and glass products.

Automatic Valve Catalog

136

Cash-Acme, Decatur, Ill., has available a twelve color-page condensed catalog containing information on 212 popular valves. Of these, 19 are entirely new and have never been catalogued before. Convenient specification tables make it an ideal source for quick valve selection.

Variable Speed Control

137

U. S. Electrical Motors, Inc., Los Angeles, Calif., has just released a completely revised, full-color brochure on the operation and application of Varitrol variable speed drive and pneumatic control systems. A special feature of the new brochure is the announcement of a U. S. Innovation —pre-engineered Varitrol instrumentation packages.

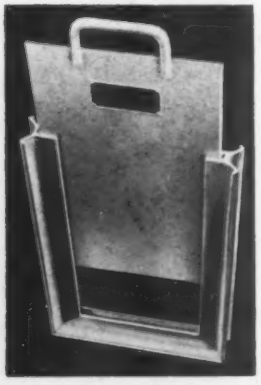
Low Cost, Precise Metering of Liquids and Gases

138

Builders Providence, Inc., div. of B-I-F Industries, Inc., Providence, R. I., has just published a bulletin on two especially accurate and economi-

1-Pc. Aluminum Guides & Stop Plates or Sluice Gates

Mean Easy Installation, Greater Economy!



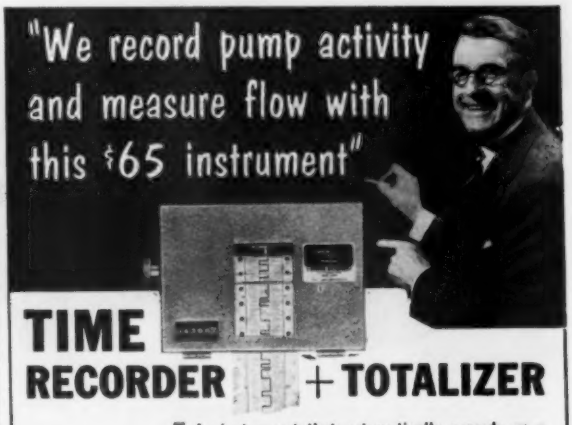
The one-piece construction of our aluminum guides eliminates clumsy machine grooved or riveted flat bar assemblies. Their ease of installation and low cost (on a per foot basis, less than that of steel or other metals) are points to consider.

Strong, durable, non-corrosive qualities of Aluminum make it important to Water and Sewage. *Washington Aluminum Engineers are available for discussion of design problems on any installation at point of planning. No obligation.* Write for nearest representative.

WASHINGTON ALUMINUM COMPANY, Inc.

Dept. 71 • Baltimore 29, Md. • Phone Circle 2-1000

"We record pump activity and measure flow with this $65 instrument"



TIME RECORDER + TOTALIZER

what T-R-T is — An instrument that automatically records on a strip chart the "on-off" time of any pump (or machine) to which it is electrically connected. Strip chart is chronologically-printed, runs up to four months without change.

what T-R-T does — Marks on chart when pump starts, how long it runs, when it stops. Elapsed time meter totals operating time. Operations counter (optional at additional cost) records number of pump starts.

how T-R-T is used — To measure flow, simply multiply rated capacity of pump per hour by hours of pump operating time. Strip chart furnishes a single-source basis for cost analysis, flow pattern, and pump maintenance. Many other applications. For full details, write for Brochure WR-1.

standard INSTRUMENT CORPORATION
657 BROADWAY, NEW YORK 12, N. Y.

cal meters the Propeloflo for liquids and the Shuntflo for air steam or gases. The six-page bulletin provides photographs, line drawings, cutaway views, and technical data tables to supplement the explanatory text.

Continuous Loss-in-Weight Feeding Systems

139

Omega Machine Co., Div. of B-I-F Industries, Inc., Providence, R. I., has published an 8-page, 3-color bulletin on simplex or duplex gravimetric feeders for liquids or solids. The bulletin provides explanatory text, dimensional drawings and tables, photographs, schematic drawings and performance charts.

Receiver Recorder and Controller

140

Bailey Meter Co., Cleveland, Ohio, has just released a sixteen-page Product Specification containing details of newly developed plug-in components for the Bailey Recorder. In all, twelve types of receivers, controllers, retransmitters, and direct measuring devices from which the recorder may be custom-built are described. Also illustrated is sealed, automatic, one year inking system and many exclusive features.

Solving Drainage Problems

141

Bethlehem Steel Co., Bethlehem, Pa., has just published a booklet on solving drainage problems.

Slide Presentation on Water and Pumping

142

Layne & Bowler Pump Co., Los Angeles, Calif., has available a new slide presentation, entitled "Your Untapped Treasure," a graphic story of water resources and pumping techniques.

Corrosion Resistant Plastic Equipment

143

Haveg Industries, Inc., Wilmington, Del., has just issued bulletin which describes the selection of the proper plastic for each and every chemical corosion problem. Such fields as the physical properties, chemical resistance, and typical equipment applications of phenolic, furane, polyvinyl chloride, polyester glass and tetrafluorothylene plastic are covered concisely and thoroughly with tables, pictures, diagrams and descriptions.

Expansion Joint Catalog

144

Badger Mfg. Co., Cambridge, Mass., announces the availability of a new 80-page catalog covering Badger S-R Expansion Joints.

Accesory Equipment For Dissolved Oxygen Analyzer

145

Beckman Process Instruments Div., Fullerton, Calif., has available Specification Sheets on accessory equipment for use with the Beckman Model 70 Dissolved Oxygen Analyzer.

Clay Pipe Folder

146

Robinson Clay Product Co., Akron, Ohio, has just published a new folder,

CONTINUED ON PAGE 116A

Synchro-Start
AUTOMATIC ENGINE CONTROLS

SPEED SENSITIVE SWITCHES
Overspeed and Underspeed

FULL AUTOMATIC CONTROLS
Starting, stopping and safety protection

D. C. SOLENOIDS
Heavy duty

SAFETY ALARM SETS
Visual and audible alarms

To furnish you with the control to fit your needs, send full engine data and installation specifications.

SYNCHRO-START PRODUCTS, INC.
Since 1932
8151 NORTH RIDGEWAY AVENUE • SKOKIE, ILLINOIS

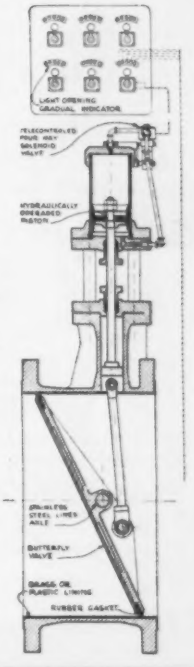
S.A.T.A.—Rome Italy—Via Belluno 1

BUTTERFLY VALVES

COMPLETE hydraulic cylinder operator and electric control. PRICES CIF any USA Atlantic port:

6"	$300	18"	$680
8"	$380	20"	$750
10"	$440	24"	$850
12"	$500	32"	$920
14"	$560	40"	$980
16"	$620		

EASY OPERATION since disc never sticks even after long periods of inactivity. Manual, hydraulic, pneumatic and float types.



S. A. T. A.
SOCIETA ANONIMA TRATTAMENTI ACQUE
ROMA
VIA BELLUNO, 1
TELEFONO 240-646 - 240-268

ROTO-TROL

RF-2

WITH ALTO-TROL

This 2-pump RF-2 Roto-Trol assures equal use and wear of both pumps. Each pump is operated on alternate starting cycles.

The RF-2 operates both pumps together, when required. RF-2 installations give dependable service year after year, with the minimum of attention.

Write for full data

WATER LEVEL CONTROLS DIVISION

HEALY-RUFF COMPANY

783 Hampden Ave., St. Paul 4, Minn.

FISHER Finds it Faster!

All-new 1959 Transistorized

M-SCOPE PIPE FINDER

only $189.50

- Greatest depth penetration
- Greatest tracing distance
- Pinpoint accuracy
- One year between battery changes
- Built-in battery testers
- 90% less maintenance costs

New, Transistorized

LEAK DETECTOR

- Finds leaks faster, more accurately.
- Weighs 80% LESS than ordinary equipment.

only $295.00

SEND FOR FREE 1959 CATALOG

FISHER Research Lab., Inc.

Dept. WS-1, Palo Alto, Calif.

New Bulletins

CONTINUED FROM PAGE 115A

describing Wedge-Lock Clay Pipe, entitled "Lock Tight Like a Railroad Coupling."

Eleventh Annual Dresser-Coupled Water Lines Report

147

Dresser Mfg. Div., One of the Dresser Industries, Inc., Braford, Pa., has just published its Eleventh Annual Water Lines Report for the year 1957.

Field Erected Steel Storage Tanks

148

Fisher Tank Co., Chester, Pa., has available an 8-page, 2-color booklet that describes the Fisher all-welded, field erected steel storage tanks.

Hydrogen Zeolite Softener

149

Cochrane Corp., Philadelphia, Pa., has announced the publication of a new eight-page Bulletin on the hydrogen zeolite process. Bulletin indicates advantages of the process, its chemistry and variations in methods for neutralizing mineral acidity of hydrogen zeolite effluent. Types of zeolites are

Valves

150

The Ohio Injector Company, Wadsworth, Ohio, has just published a new condensed version of their General Catalog which lists the company's complete line of valves.

Valve Regulators

151

Rockwell Manufacturing Co., Pittsburgh, Pa., has published a new eight-page, photo-illustrated bulletin that describes the functions, applications and operation of Rockwell-Nordstrom valve regulators with Republic controls.

Insert Plastic Dall Flow Tube

152

Builders-Providence, Inc., a division of B-I-F Industries, Inc., Providence, R. I., has published a 4-page, 2-color bulletin on the recently developed, lightweight, low cost, corrosion-resistant insert plastic Dall Flow Tube, Model DFT-PI. The bulletin includes photographs, dimensional and cost-comparison tables, cutaway views and performance charts in addition to the explanatory text.

Sewage System Data File

153

Kenco Pump Div., The American Crucible Products Co., Cleveland, O., has just released a new data file on septic tank and sewage applications which presents a complete round-up of underground and above-ground disposal filter systems together with engineering data on Kenco's complete package alternator, the Kenco-Trol, and Kenco's new heavy-duty septic tank pumps, Models 119 and 130.

Incinerator Catalog

154

Joseph Goder, Inc., Chicago, Ill., has available a catalog designed to present complete information on all phases of incinerator selection, installation and operation for every type of refuse destruction. This new illustrated catalog is titled "The Incinerator Blue Book."

Digester Brochure

155

Infilco, Inc., Tucson, Ariz., has just published a 12-page brochure on the anaerobic process in sewage and waste treatment. Replete with diagrams and illustrations, and printed in two colors, it discusses successful methods in the treatment of sewage sludge and other organic wastes by digestion, and describes various types of digesters with a section on suggested specifications.

Concrete For Sewerage Work

156

Portland Cement Association, Chicago, Ill., has available a reprint from their Journal entitled "Concrete for Sewerage Work."

Consulting Engineers *IN WATER & SEWAGE WORKS*

ALBRIGHT & FRIEL INC.
Consulting Engineers
Water, Sewage, Industrial Wastes and Incineration Problems—City Planning, Highways, Bridges and Airports—Dams, Flood Control, Industrial Buildings—Investigations, Reports, Appraisals and Rates—Laboratory for Chemical & Bacteriological Analyses—Complete Service on Design and Supervision of Construction.
Three Penn Center Plaza
Philadelphia 2, Pa.

Bowe, Albertson & Associates
Engineers
Water and Sewage Works—Industrial Wastes—Refuse Disposal—Municipal Projects—Industrial Buildings—Reports—Plans—Specifications—Supervision of Construction and Operation—Valuations—Laboratory Service
75 West Street New York 6, New York

CAPITOL ENGINEERING CORPORATION
Engineers—Constructors—Management
SEWAGE SYSTEMS — Designs and Surveys, Planning, Bridges
WATER WORKS — Roads and Streets, Airports, Dams
Executive Offices
DILLSBURG, PENNSYLVANIA

Alvord, Burdick & Howson
Engineers
Water Works, Water Purification, Flood Relief, Sewerage, Sewage Disposal, Drainage, Appraisals, Power Generation
20 N. Wacker Drive, Chicago 6, Ill.

BOYLE ENGINEERING
Consulting Engineers
Water—Sewers—Streets
Structures—Surveys
Reports—Special Districts
331 Spurgeon Bldg. Santa Ana, Calif.
3913 Ohio, Rm. 200 San Diego 4, Calif.

The Chester Engineers
Water Supply and Purification—Sewage and Industrial Waste Treatment—Power Plants—Incineration—Gas Systems—Valuations—Rates—Management—Laboratory—City Planning
601 Suismon Street
Pittsburgh 12, Penna.

JOHN J. BAFFA
Consulting Engineer
Water Supply and Treatment
Sewerage and Sewage Treatment
75 West Street New York 6, N. Y.

Brockway, Weber & Brockway Engineers
INCORPORATED
George S. Brockway — Ray R. Weber
George R. Brockway
STAFF
H. L. Fitzgerald, T. A. Clark, B. E. Whittington, R. E. Owen, John Adair, Jr., C. A. Anderson, T. R. Demery
Civil, Structural, Sanitary, Municipal, Electrical
West Palm Beach, Florida

Chas. W. Cole & Son
Engineers — Architects
Sewerage, Water Supply, Bridges, Highways, Toll Roads, Industrial, Municipal and Commercial Buildings
220 W. LaSalle Ave., South Bend, Indiana
Central 4-0127

MICHAEL BAKER, JR., INC.
The Baker Engineers
Civil Engineers, Planners, and Surveyors
Airports, Highways, Sewage Disposal Systems, Water Works Design and Operation—City Planning—Municipal Engineering—All types of Surveys
Home Office: Rochester, Pa.
Branch Offices:
Jackson, Miss. Harrisburg, Pa.

Buck, Seifert and Jost
Consulting Engineers
Water Supply, Sewage Disposal, Hydraulic Developments, Reports, Investigations, Valuations, Rates, Design Construction Operation Management, Chemical and Biological Laboratories
112 East 19th St. New York

CONSOER, TOWNSEND & ASSOCIATES
Water Supply, Sewerage, Flood Control & Drainage, Bridges, Express Highways, Paving, Power Plants, Appraisals, Reports Traffic Studies, Airports, Gas & Electric Transmission Lines.
360 East Grand Ave. Chicago 11, Ill.

Betz Laboratories, Inc.
CONSULTING ENGINEERS
INDUSTRIAL WASTE
INDUSTRIAL WATER
ANALYSIS DESIGN
INVESTIGATIONS OPERATION
Gillingham & Worth Sts.
Philadelphia 24, Pa.

BURGESS & NIPLE
Civil and Sanitary Engineers
Water Supply and Purification
Sewerage and Sewage Treatment
Appraisals, Reports, Valuations
2015 West Fifth Avenue
Columbus 12, Ohio

CARL C. CRANE, Inc.
CONSULTING ENGINEERS
2702 MONROE ST.
MADISON 5, WISCONSIN

BLACK & VEATCH
Consulting Engineers
Sewage—Waste Disposal—Water
Electricity—Industry
Reports, Design, Supervision of Construction, Investigations, Valuations and Rates
1500 Meadow Lake Parkway
Kansas City 14, Missouri

BURNS & McDONNELL
Engineers—Architects—Consultants
KANSAS CITY, MO.
P.O. Box 7088
Phone: DElmar 3-4375

MR. CONSULTING ENGINEER
Are you interested in both
WATER & SEWAGE
If so there is no better place for your professional card than in this dual interest magazine.
Water & Sewage Works

BOGERT AND CHILDS
CONSULTING ENGINEERS
Clinton L. Bogert, Ivan L. Bogert, Robert A. Lincoln, Fred S. Childs, Donald M. Ditmars, Charles A. Manganaro, William Martin
Water & Sewage Works • Refuse Disposal • Drainage • Flood Control • Highways and Bridges • Airfields
145 East 32nd Street, New York 16, N. Y.

Camp, Dresser & McKee
Consulting Engineers
6 Beacon Street, Boston 8, Mass.
Water Works and Water Treatment; Sewerage and Sewage Treatment; Municipal and Industrial Wastes; Investigations and Reports; Design and Supervision; Research and Development; Flood Control.

ROY B. EVERSON
Water Treatment Service Since 1900 for Swimming Pool Circulating Systems. Purification Systems as applied to Sewage Treatment and Water Works. A New System for Automatic Control.
233 W. Huron Street, Chicago 10, Ill.

Additional Engineers Cards on Next Page

ENGINEER ASSOCIATES
Consulting Engineers
Sewage Disposal Systems, Water Works Design, Airports, Highways and Bridges, City Planning & Engineering for Building Design
312 N. W. Eighth St.
Evansville, Indiana

HASKINS, RIDDLE & SHARP
Consulting Engineers
Water—Sewage & Industrial Wastes—Hydraulics
Reports, Design, Supervision of Construction
Appraisals, Valuations, Rate Studies
1009 Baltimore Ave. Kansas City 5, Mo.

Morris Knowles, Inc.
Engineers
Water Supply and Purification, Sewerage and Sewage Disposal Valuations, Laboratory, City Planning
1312 Park Building, Pittsburgh, Pa.

FAY, SPOFFORD & THORNDIKE, INC.
Engineers
Water Supply and Distribution — Drainage
Sewerage and Sewage Treatment
Airports — Bridges — Express Highways
Port and Terminal Works — Industrial Plants
Investigations, Reports, Designs, Valuations
Supervision of Construction
11 BEACON STREET, BOSTON 8, MASS.

HAVENS AND EMERSON
A. A. BURGER
HARRY H. MOSELEY J. W. AVERY
FRANK S. PALOCSAY EDWARD S. ORDWAY
FRANK C. TOLLES, CONSULTANT
CONSULTING ENGINEERS
WATER, SEWERAGE, GARBAGE, INDUSTRIAL WASTES VALUATIONS—LABORATORIES
LEADER BLDG. CLEVELAND 14, O.
WOOLWORTH BLDG. NEW YORK 7, N. Y.

MR. CONSULTING ENGINEER
Are you interested in both
WATER & SEWAGE
If so there is no better place for your professional card than in this dual interest magazine.
Water & Sewage Works

FINKBEINER, PETTIS & STROUT
Carleton S. Finkbeiner Charles E. Pettis
Harold K. Strout
CONSULTING ENGINEERS
Water Supply, Water Treatment, Sewerage, Sewage Treatment, Wastes Treatment, Bridges, Highways & Expressways
2130 Madison Avenue Toledo 2, Ohio

Hayden, Harding & Buchanan, Inc.
Consulting Engineers
John L. Hayden
John H. Harding Oscar J. Compto
Waterworks, Sewerage, Civil, Mechanical, Electrical, Structural
1340 Soldiers Field Road, Boston 35, Mass.

LOCKWOOD GREENE ENGINEERS, INC.
Architects - Engineers
Montgomery Building
SPARTANBURG, S. C.
Water Supply—Power Plants
Sewage Disposal—Valuations & Appraisals
Industrial Waste—Industrial Plant Design

Freese & Nichols
FORT WORTH, TEXAS
Freese, Nichols & Turner
HOUSTON, TEXAS
Industrial and Municipal Engineering—Water Supply and Purification—Sewerage and Industrial Waste Treatment—Highways and Structures—Dams—Drainage Works—Airports—Investigations—Valuation—Design and Supervision

HAZEN AND SAWYER
ENGINEERS
Richard Hazen Alfred W. Sawyer
H. E. Hudson, Jr.
Water and Sewage Works
Industrial Waste Disposal
Drainage and Flood Control
122 East 42nd St. New York 17, N. Y.
3333 Book Building Detroit 26, Mich.

WM. S. LOZIER CO.
Sewerage, Sewage Disposal, Water Supply, Water Purification
Refuse Disposal
Consulting Engineers
10 Gibbs Street Rochester 4, N. Y.

GANNETT FLEMING CORDDRY AND CARPENTER, INC.
Engineers
HARRISBURG, PA.
Pittsburgh, Pa. Daytona Beach, Fla.
Philadelphia, Pa.
Water Works, Sewage, Industrial Wastes and Garbage Disposal—Roads, Airports, and Garbage Disposal—Roads, Airports, Bridges, Flood Control, Traffic & Parking, Appraisals, Investigations & Reports.

Henningson, Durham & Richardson
Engineers • Architects • Planners • Consultants
ENGINEERING SINCE 1917
Reports, Planning, Appraisals, Architectural Design, Highways, Bridges, Streets, Airports, Sewerage, Waterworks, Power Plants, Electrical Systems, Natural Gas Systems, Industrial Design
OMAHA
2962 Harney Street
WEbster 9515
COLORADO SPRINGS
First Natl. Bank Building
MElrose 4-4393

Metcalf & Eddy
Engineers
Water, Sewage, Drainage, Refuse and Industrial Waste Problems
Airports Valuations
Laboratory
Statler Building, Boston 16

GILBERT ASSOCIATES, INC.
Engineers and Consultants
Water Supply and Purification
Sewage and Industrial Waste Treatment
Chemical Laboratory Service
Investigations and Reports
New York Reading, Pa. Washington
Houston Philadelphia

The Jennings-Lawrence Co.
Civil & Municipal Engineers
Consultants
Water Supply, Treatment & Distribution
Sewers & Sewage Treatment
Reports—Design—Construction
1392 King Ave. Columbus 12, Ohio

O'BRIEN & GERE
Consulting Engineers
Water Supply, Treatment and Distribution
Sewerage and Sewage Treatment
Industrial Waste Treatment—Flood Control and Drainage—Rate Studies
400 East Genesee Street Syracuse 2, N. Y.

MR. CONSULTING ENGINEER
Are you interested in both
WATER & SEWAGE
If so there is no better place for your professional card than in this dual interest magazine.
Water & Sewage Works

Jones, Henry & Williams
Consulting Sanitary Engineers
Water Works
Sewerage & Treatment
Waste Disposal
821 Security Bldg. Toledo 4, Ohio

PARSONS, BRINCKERHOFF HALL & MACDONALD
G. Gale Dixon, Associate
Civil and Sanitary Engineers
Water, Sewage, Drainage and Industrial Waste Problems.
Structures—Power—Transportation
165 Broadway New York 6, N. Y.

GREELEY AND HANSEN
Engineers
Samuel A. Greeley Paul Hansen (1920-1944)
Paul E. Langdon Kenneth V. Hill
Thomas M. Niles Samuel M. Clarke
Water Supply, Water Purification
Sewerage, Sewage Treatment
Flood Control, Drainage, Refuse Disposal
220 S. State Street, Chicago 4

Engineering Office of CLYDE C. KENNEDY
SANITARY ENGINEERING
SAN FRANCISCO

MALCOLM PIRNIE ENGINEERS
Malcolm Pirnie Ernest W. Whitlock
Robert D. Mitchell Carl A. Arenander
Malcolm Pirnie, Jr.
MUNICIPAL AND INDUSTRIAL
Water Supply—Water Treatment
Sewage and Waste Treatment
Drainage—Sewerage—Refuse Disposal
25 West 43rd St. New York 36, N. Y.

Additional Engineers Cards on Next Page

THE PITOMETER ASSOCIATES, INC.
Engineers
Water Waste Surveys
Trunk Main Surveys
Water Distribution Studies
Water Measurements & Special Hydraulic Investigations
New York, 50 Church Street

ROBERT AND COMPANY
ASSOCIATES
Engineering Division
ATLANTA

Alden E. Stilson & Associates
Limited
Consulting Engineers
Water Supply—Sewage—Waste Disposal
Bridges—Highways—Industrial Buildings
Studies—Surveys—Reports
2060 E. 9th Street, Cleveland 15, Ohio
245 North High Street, Columbus 15, Ohio

LEE T. PURCELL
Consulting Engineers
Water Supply & Purification; Sewerage & Sewage Disposal; Industrial Wastes; Investigations & Reports; Design; Supervision of Construction & Operation
Analytical Laboratories
36 De Grasse Street Paterson 1, N. J.

MR. CONSULTING ENGINEER
Are you interested in both
WATER & SEWAGE
If so there is no better place for your professional card than in this dual interest magazine.
Water & Sewage Works

Weston & Sampson
Water Supply, Water Purification, Sewerage, Sewage and Industrial Waste Treatment, Corrosion Control, Laboratory Service Supervision, Valuations
14 Beacon St. Boston, Mass.

Rader and Associates
Consulting Engineers
Water Works, Sewers, Refuse Disposal and Other Public Works Engineering Reports, Investigations, Consultations, Plans, Specifications and Supervision of Construction Work
111 N.E. 2nd Avenue Miami 32, Florida

Benjamin L. Smith & Associates
Engineers
Investigations—Reports
Designs—Supervision—Valuations
Municipal Engineering and Public Utilities
11 North Pearl Street
Albany 7, New York

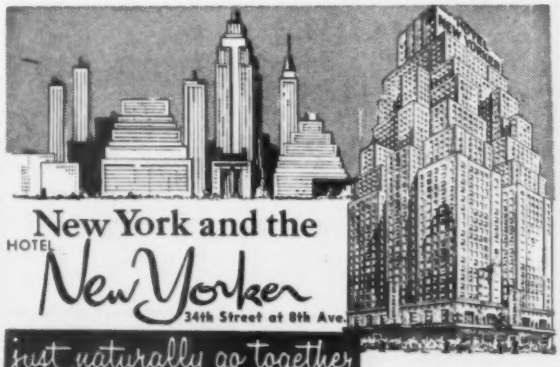
Whitman & Howard
Engineers (Est. 1869)
Water Supply, Water Purification, Sewerage, Sewage Disposal, Water Front Improvements and all Municipal and Industrial Development Problems, Investigations, Reports, Designs, Supervision, Valuations.
89 Broad St., Boston, Mass.

Thomas M. Riddick
Consulting Engineer and Chemist
Municipal and Industrial Water Purification Sewage Treatment, Plant Supervision, Stream Pollution Investigations, Chemical and Bacteriological Analyses.
389 East 149th Street
New York 55, N. Y.

STANLEY ENGINEERING COMPANY
Consulting Engineers
Hershey Building Muscatine, Iowa
208 S. LaSalle St. Chicago 4, Ill.

WHITMAN, REQUARDT & ASSOCIATES
Engineers—Consultants
Civil—Sanitary—Structural—
Mechanical—Electrical
Reports, Plans, Supervision, Appraisals
1304 St. Paul Street
Baltimore 2, Maryland

ACROSS FROM THE CAPITOL
FACING CAPITOL PLAZA
Large fireproof hotel surrounded by parks—near all sightseeing and Union Station. Garage on premises. Coffee Shop—Cocktail Lounge—convention facilities.
From $5.50 Single With Bath
spacious guest rooms, air-conditioned if desired
HOTEL CONTINENTAL
WASHINGTON
D. C.



New York's largest and most conveniently located skyscraper hotel. 2500 outside rooms, all with bath and free radio. 100% television available. Meditation Chapel open to all faiths. Direct tunnel connection to Pennsylvania Station. Facilities from 100 to 1,200 for banquets, special functions and private meetings.

THREE POPULAR RESTAURANTS
Lamp Post Corner Golden Thread Cafe The Coffee House
Singles from $7 Doubles from $11 Suites from $23
JOSEPH MASSAGLIA JR., President
CHARLES W. COLE, Gen. Mgr.

ACROSS THE U.S.A. and in HAWAII
SANTA MONICA, CALIF. Hotel Miramar
SAN JOSE, CALIF. Hotel Sainte Claire
LONG BEACH, CALIF. Hotel Wilton
GALLUP, N.M. Hotel El Rancho
ALBUQUERQUE, Hotel Franciscan
HONOLULU Hotel Waikiki Biltmore
WASHINGTON, D.C. Hotel Raleigh
HARTFORD, CONN. Hotel Bond
CINCINNATI, O. Hotel Sinton
PITTSBURGH, PA. Hotel Sherwyn
DENVER, COLO. Hotel Park Lane
NEW YORK CITY Hotel New Yorker
World famed hotels—Teletype service—Television

When this Nameplate goes into place . . .

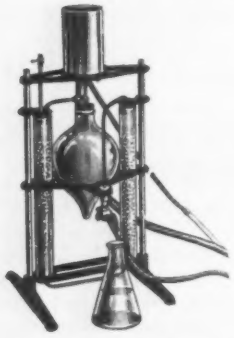
YOU KNOW YOU HAVE *the Best*

ROBERTS FILTER MANUFACTURING CO.

**607 COLUMBIA AVE.
DARBY, PA.**

ENSLOW

STABILITY INDICATOR



For checking the equilibrium of a finished water, and supplying an index useful in controlling anti-corrosion treatment. Catalog No. 83-895

WRITE:

Phipps & Bird, Inc.

P. O. Box 2V Richmond 5, Va.

Advertisers Index

A

*Amercoat Corp. 107A

B

Badger Meter Mfg. Co. 30A-31A
*B-I-F Industries, Inc. ..... 28A-29A-Back Cover
Buffalo Meter Co. 38A
*Builders-Providence, Inc. ..... 28A-29A-Back Cover

C

Calgon Co. 46A
Cast Iron Pipe Research Ass'n 39A-40A-41A
*Chain Belt Co. 26A
Chapman Valve Mfg. Co. 34A-35A
*Chicago Bridge & Iron Co. ..... Inside Back Cover
*Chicago Pump Co. 101A
Clow & Sons, James B. 42A-43A
*Combustion Engineering 103A
Copon Associates 44A
*Columbia Southern Chem. Co. 109A
Consulting Engineers 117A-118A-119A

D

Darling Valve & Mfg. Co. 14A

E

Eddy Valve Co. 6A

F

*Fischer & Porter Co. 2A
Fisher Research Lab. Inc. 116A
Ford Meter Box Co. 37A

H

*Hardinge Company, Inc. 17A
Healy-Ruff Company 116A
Hersey Manufacturing Company 22A
Homestead Valve Mfg. Co. 27A
Hooker Chemical Corp. 104A
Hotel Continental 119A

I

Industrial Chemical Sales 24A
*Infilco Inc. 106A

K

*Komline-Sanderson Engineering Corp. 110A

L

Leopold & Co., F. B. 5A
*Link-Belt Co. 33A
Lock Joint Pipe Company ..... Inside Front Cover
*Ludlow Valve Mfg. Co., Inc. 113A

M

*M & H Valve & Fittings Co. 32A
Minneapolis-Honeywell Reg. Co. 10A
Mueller Co. 20A-36A
*Multiplex Mfg. Co. 108A

N

*National Clay Pipe Mfrs. 111A
*Neptune Meter Company 48A

P

*Pacific Flush Tank Co. 12A
Payne Dean & Company 13A
Phelps Dodge Refin. Corp. 25A
*Phipps & Bird, Inc. 120A
*Pratt Co., Henry 4A
*Pressure Concrete Co. 108A

R

*Roberts Filter Co. 120A
Rockwell Mfg. Co. 45A
Rockwell Co., W. S. 110A
Royer Fdry. & Mach. Co. 102A

S

*Simplex Valve & Meter Co. 1A
Sparling Meter Co. 19A
Standard Dry Wall Products, Inc. 21A
Standard Instrument Corp. 114A
Synchro-Start Products, Inc. 115A

U

U. S. Rubber 18A

W

*Walker Process Equipment, Inc. 16A
*Wallace & Tiernan, Inc. 15A
*Washington Aluminum Co. 114A
Waukesha Motor Co. 105A
*Wedge-Lock Clay Pipe 111A
*Wheeler Mfg. Co., C. H. 23A
Wood Co., R. D. 8A
Woodward Iron Co. 47A

*Advertisers represented in the 1958 Reference and Data Number with Catalog specifications copy. Please refer to that issue for additional information concerning their product or equipment.

WATERSPHERE

200,000-gal. Watersphere provides pleasing welcome to motorists along U.S. Highway 6. Along with a 1,000,000-gal. Horton® steel reservoir, it provides dependable pressure and increased water reserves for growing Griffith, Indiana. Both structures were pickled and painted before shipment. Engineers were Clyde E. Williams & Assoc. Inc.

once a bold new design . . .

NOW
A SYMBOL OF PROGRESS

The Horton Watersphere® because of its combination of sound engineering and striking, functional beauty, has quickly become a symbol of progress for water-wise communities all over the country.

The prevalence of Waterspheres on the U.S. community scene is another example of how CB&I's 67 years of *craftsmanship in steel* can serve your community's increased water needs with assurance of *proven* engineering excellence backed by complete facilities for the fabrication and erection of any steel plate water storage structure.

Write our nearest office for details. Ask for the *Watersphere* and *Waterspheroid® Bulletin.*

YOU CAN BE SURE WITH STEEL . . . AND CERTAIN WITH CB&I.

CBI

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
New Orleans • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • South Pasadena • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, GREENVILLE, PA. and NEW CASTLE, DEL.

FOR DISTRIBUTION SYSTEMS . . .

You Can Depend on Builders Butterfly Valves!

Have you experienced a valve freeze, a broken shaft, or a shutoff failure during an emergency? Danger, delay, and dollar-loss can be eliminated with Builders Butterfly Valves . . . *durable* and *dependable* . . . built to meet the rugged demands of distribution service.

Builders-Providence specializes in AWWA Butterfly Valves with exceptional performance characteristics which have led to their increased application in the distribution field. More and more municipalities are standardizing on Butterfly Valves for new extensions and improvements. They are being used as isolation and shutoff valves, as pressure reducing valves, as automatic check valves on pump discharge, and for altitude storage tank control.

Performance-proved in the 25 to 125 psi range . . . and meeting or surpassing AWWA Specifications, Builders Butterfly Valves offer:

- Greater ease of operation . . . by one man, even if valve has been in one position for years.
- Savings in installation time and space . . . durable, dependable design and construction permit burial without a vault.
- Savings in valuable water . . . Builders Butterfly Valves remain bubble-tight after hundreds of thousands of operations.
- Greater strength and longer life . . . *one-piece* stainless steel shaft will not shear off or become distorted in use.

Let Builders-Providence . . . offering nationwide sales and service through local offices . . . save you time and money as your ONE SOURCE - ONE RESPONSIBILITY supplier of water works equipment. Write **B-I-F Industries, Inc., Dept. U, 350 Harris Avenue, Providence 1, R. I.**

Free Bulletin

Request Bulletin 650.20-1 describing Builders 125 psi Butterfly Valves.

ONE SOURCE –
ONE RESPONSIBILITY

Meters and instruments for measuring flow, level, pressure, or temperature. Feeders for dry, liquid and gaseous materials. Process equipment. Controls for flow responsive pacing, controlling process variables, flow summation, pump control systems, supervisory control systems. Filters and filter operating equipment. Butterfly Valves. Proportioning Pumps.

B-I-F

B-I-F INDUSTRIES

BUILDERS-PROVIDENCE • PROPORTIONEERS • OMEGA